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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Dangers of Dust Explosion

THE paper presented yesterday by Dr. Gibbs at the first meeting this winter of the Chemical Engineering Group dealt with a subject that is of great importance to industry, and especially to the chemical industry. The risks involved in manufacture, such as loss by dust explosion, are not only receiving more attention than in the past, but the problem of atmospheric pollution generally is being recognised as one of considerable economic significance. The decay of stonework owing to the acid nature of soot is, perhaps, the most obvious example of the damage done by a dust-laden atmosphere, while the hindrance to the growth of vegetation represents a heavy annual loss in agricultural districts adjoining manufacturing towns. Dr. Gibbs dealt in his paper with methods of allaying aerosols, such as electrical precipitation, and it is along these lines, coupled with more satisfactory methods of burning coal, that industry may hope to solve the problem of dust and its evil effects.

Of more particular interest to the chemical manufacturer, however, was the part of the paper devoted to a discussion of dust explosions in industry. After leading up to this subject by an account of the many ways in which aerosols are produced in chemical processes, Dr. Gibbs described the nature of such explosions and the measures to be taken as a precaution against them. It is principally in connection with grinding operations that such disasters are likely to occur, although this risk is always associated with the handling of the powdered products themselves. While common-sense measures, such as the exclusion of flames of any sort from chemical works, are usually strictly adhered to, it cannot be too strongly emphasised that the accumulation of dust is an elementary cause of explosion which can usually be avoided. The work of Dr. Gibbs in this connection deserves the close attention of every chemical manufacturer.

Fischer on the Future of Fuel

"PRIMARY tar treatment which yields chiefly heavy fuels, and the Synthol process which converts semi-coke into light fuels, would supplement one another in a most fortunate sequence of manufacture, leaving behind nothing but the mineral constituents of coal." At first sight this hypothesis will, no doubt, strike the sceptical fuel consumer as a trifle too Utopian, but it comes from Franz Fischer and represents his considered judgment after a close examination of the much-vaunted claims nowadays made in connection with the complete conversion of coal into oils. Fischer's dictum is quoted for the reason that amongst all the publicity lately given to developments foreshadowed in German technology, no attention whatever seems to have been accorded to processes involving the primary production of tar—methods which, although they may not provide the ideal, have at least the saving grace of being more or less technically certain. Fischer obviously has no mistaken notions as to the one outstanding condition which this manufactured oil-fuel problem must ultimately fulfil, and it must, too, be apparent to anyone who has studied the economics of the situation that the *ne plus ultra* must continue to lie in the conversion of coal completely into liquid substances, with the strict avoidance of gaseous and solid by-products. This fact being accepted, the problem remaining to be resolved is whether the ultimate result can be obtained in one operation, on the lines of the Bergius methods, or whether or not it will have to be effected in two stages as intimated by Fischer in the statement quoted above.

In examining Fischer's opinion one can afford to neglect any suspicion of bias that might seem to influence his views owing to his personal association with the Synthol process. The production of Synthol is merely a variation of the main principle of catalytic hydrogenation, so that in attaining the end in view it would be a simple matter to introduce, in the second stage, alternative methods that would in no way infringe Fischer's patents. There are already notable

examples in the processes of the Badische Company and of M. Patart, while plenty of scope even now seems to remain for ringing the changes on the first principle involved. If we accept the fact that the direct combustion of volatile solid fuels is wasteful, then we must look for an ideal that will involve the treatment of coal in such a manner as to yield just the quantity of semi-coke that will satisfy the whims of those who regard the open domestic fire as the Englishmen's prerogative, the balance being converted by the water gas method into liquid fuels.

It might be argued that the process of low temperature carbonisation immediately falls short of this ideal, for the reason that it involves the concurrent production of tar and surplus gas. So far as the tar is concerned, however, this is of a strictly primary character, and obviously by the selection and invention of suitable methods it can be worked up into valuable products such as light and heavy liquid fuels and lubricants. The surplus gas is readily disposed of, for it has been shown that the catalytic production of liquid fuels is not restricted to the use, as a primary material, of water gas, but that the richer gases derived from the distillation of coal may be equally well employed. Consequently, this surplus gas might well be turned into the water gas stream. It must be admitted that in framing his hypothesis Fischer is looking well ahead. One is as yet ignorant of its commercial feasibility and to some extent of the exact description and means of utilisation of the products that would be yielded. The great attraction of it is that there would be few complications in the way of maintaining a balance between solid and liquid products in accordance with the demands of the moment, for the flexibility of the dual process would enable the output of the two types of fuel to be modified at will.

Hydrocarbons from Carbides

THE conditions under which hydrocarbons, and more particularly liquid hydrocarbons, are formed by the decomposition of various carbides are of unusual interest and importance, and it is, therefore, a little puzzling to find that Fischer is evidently not impressed with the possibilities afforded for relieving the liquid fuel situation in this way. In articles that have appeared in our columns it has been shown beyond question that synthetic alcohol from calcium carbide, by way of acetylene and acetaldehyde, is technically possible, and has, moreover, been produced in comparatively large quantities. Here we have, however, a three-stage catalytic process that could in no sense be characterised as simple, while the final process of converting acetaldehyde into alcohol calls for the use of large volumes of hydrogen. The fundamental requirement is, of course, cheap electrical energy, and it was, we think, Mr. Rex Furness who pointed out that, if power could be obtained at a figure so low as 0·1d. per unit, it should be possible to manufacture alcohol for about 2s. per gallon at works. This carbide alcohol presents, too, the advantage that foodstuffs are not consumed as in the case of fermentation alcohol.

Fischer seems to base his views of the process on the fact that yields of liquid hydrocarbons so far obtained from carbides are too small, and that, even should they be capable of considerable improvement, their production would only acquire practical importance if decomposition could be effected by steam. As he says, those carbides that give the better yields of liquid hydrocarbons are unfortunately very costly, such, for example, as the carbides of cerium, lanthanum, thorium and uranium. There remains, of course, the possibility of using those carbides which generate methane, but even then it may be argued that a more economical method for the preparation of methane is by the reduction of carbon monoxide *via* the water gas process. The majority will agree that the future of the carbide field of research remains obscure, but not so obscure as to justify a discontinuation of investigatory work in connection with it.

A Million for Coal Research

PROFESSOR A. W. NASH, of Birmingham University, recently concluded a really useful review of the coal situation from the scientific side with an appeal to the Government to supplement the subsidy of £10,000,000 by a further million to be spent on large scale experimental work. His own hopes seem to lie largely in the direction of low temperature carbonisation, though due account is taken of the possibilities elsewhere. In the last annual report of the Committee of Privy Council for Scientific and Industrial Research, the view is expressed that, though low temperature carbonisation is attractive, no single process has yet been established which would be suitable for application on a national scale. In the circumstances, Professor Nash asks, is it not our duty to attempt to save the position by giving material help to some organisation which is prepared to experiment on a practical scale? Accepting the view that a subsidy of £10,000,000 is considerably cheaper than a coal strike, he suggests that the Government might well spare a further million for such experimental work, on the ground that if, at the end of five years, we could produce with Government aid one type of low temperature retort capable of producing successfully the various end products required from one type of coal, private enterprise and capital could be trusted to do the rest.

In view of appeals of this sort with which every researcher will sympathise, it seems to us desirable that no one should light-heartedly belittle the value of chemical research in this country. That it has attained its most perfect form need not be argued; that it is sincere, has already achieved important results, and deserves every encouragement may equally be taken for granted. Both the retiring and the incoming presidents of the Chemical Society, coming to their conclusions quite independently, recently expressed the highest satisfaction at the progress chemical research has made in recent years. In the case of Professor Wynne, so responsible an authority as *The Times* so completely misread his presidential address as to attribute to him the view that in this matter we are appreciably below the Continental standard. It was really Meldola who many years ago expressed that view—probably with justice at that time—and it was Professor Wynne's purpose to show, as we think he did conclusively, that it is not applicable

to the present state of British chemical research. Criticism of this kind not merely does not help; it actively discredits and hinders good work. In pleasant contrast with it is the review which a Birmingham journal published the other day of the valuable work done in the Birmingham University chemical laboratories during the six years' tenure of a single professorship now on the point of closing. What has been done under Professor Morgan in Birmingham, what was done years ago by Sir Henry Roscoe in Manchester, what is being done by many others at similar centres throughout the country, is all part of the great story of chemical progress. It is a story that should bring honour to the workers of the past, and inspiration to those who have to carry on their work in the future.

Russia's Appeal to Science

THE recent receipt from Leningrad University of some copies of the journal of the Russian Physico-Chemical Society seemed to support a hope that sanity, and with it some respect for scientific knowledge, was gradually returning to that unhappy land. These have now been followed by the first four numbers of a new and much better produced journal of Russian chemical industry, of which so competent a Russian scholar and scientist as Dr. Nierenstein, of Bristol, speaks well in this issue. From an official letter, which accompanied the volumes, from Professor Hadraf, of Moscow, we learn that the new journal is published by the "Council of the Meetings of the Representatives of the Fundamental Chemical Industry with the Chairmanship of the High Council of National Economy" in Moscow, and a hope is expressed that "this will be the beginning of a closer intercourse between both the Russian and the English chemical worlds." The new Soviet nomenclature is not distinguished for simplicity, and the rather lengthy title we have quoted conveys no very specific meaning, but it does rather suggest some kind of understanding between the Government authorities and the surviving representatives of Russian chemistry. The journal is edited by Professor Voroshtsheff, who has, it is satisfactory to hear, a strong editorial board which includes several well-known Russian chemists.

All this is sincerely to be welcomed, for the reason that not only in such matters as health, sanitation, and food supplies, but in the economic development of the natural resources of the country, science, and especially the science of chemistry, must be an essential factor. The Russian leaders have obviously long since discovered that their revolution was not the picnic they had expected, and disillusioned on many points they have now to address themselves to the fundamental problems of national maintenance, of which the revolution has settled very few. It is something to know that they are turning in their troubles to the men of science, and recognising the essential part that reason, knowledge, and trained intelligence must play in any movement that is to save the country. In this difficult work the chemists of Russia will have the sincere sympathy of their British colleagues, whose relief funds probably helped to keep many of them and their families alive.

Training for Chemical Engineers

THE inquiry we published a fortnight ago from a graduate in chemistry as to the training required for qualification as a chemical engineer is one of several we have from time to time received. The answer published in this issue from a "Chemical Engineer," who is able to speak with authority on the subject, insists on one point that it is highly necessary to keep in view, namely, that the profession of chemical engineering calls for distinctly stiff qualifications. It involves, in fact, a double qualification in the sciences of chemistry and engineering, and that obviously means a long and rather expensive term of study. The Institution has done right, we think, in setting the standard high, for only in that way is it possible to give chemical engineering the distinctive rank among the other professions desired for it. In this matter, however, some room has been left for practical compromise, and the facilities indicated by our correspondent may still enable a serious student, to whom a full post-graduate course is not possible, to obtain a useful if not the highest qualification. Chemical students who contemplate chemical engineering as a career may be advised to consult the Institution of Chemical Engineers or the Chemical Engineering Group at Abbey House, Victoria Street, London, S.W. Their inquiries, we feel sure, will be courteously attended to, and the organisations themselves will benefit from a more direct and practical knowledge of the kind of help and guidance that such students need.

Books Received

THE ENRICHMENT OF COAL GAS BY THE INJECTION OF OIL INTO THE RETORTS DURING CARBONISATION. Fuel Research Board Technical Paper No. 14. London: H.M. Stationery Office. Pp. 61. 1s. 9d.

THE CONFESSIONS OF A CAPITALIST. By Sir Ernest J. P. Benn. London: Hutchinson and Co. Pp. 287. 18s.

RUSSIAN JOURNAL OF CHEMICAL INDUSTRY, published by the "Council of the Meetings of the Representatives of the Fundamental Chemical Industry with the Chairmanship of the High Council of the National Economy" in Moscow.

The Calendar

Oct.		
12	Institute of Metals (Scottish Section): Chairman's Address, John Stirling. 7.30 p.m.	39, Elmbank Crescent, Glasgow.
12	Ceramic Society: "The Ball Clays of North and South Devon." Dr. A. Scott. 7.30 p.m.	Central School of Science, Stoke-on-Trent.
13	Institution of Petroleum Technologists: "Geology of Java." E. Parsons.	Aldine House, Bedford Street, Strand, London.
14	Institution of Chemical Engineers: Reception to meet the new President, Sir Frederic Nathan. 8.30 p.m.	Science Museum, South Kensington, London.
15	Optical Society: Ordinary Meeting. 7.30 p.m.	Imperial College of Science and Technology, South Kensington.
15	Chemical Society: Ordinary Scientific Meeting. 8 p.m.	Burlington House, Piccadilly, London.
16	Society of Dyers and Colourists (Manchester Section): "High Energy Chemistry." Professor E. C. C. Baly. 7 p.m.	36, George Street, Manchester.
16	Institute of Metals (Swansea Section): Chairman's Address, Captain Hugh Vivian. 7.15 p.m.	University College, Singleton Park, Swansea.
19	Chemical Industry Club: Annual General Meeting. 8 p.m.	2, Whitehall Court, London, S.W.1.

Phenol-Formaldehyde Resins as Constituents of Lacquers and Varnishes

By A. C. Hopper

The writer draws attention to the increasing importance which synthetic resins are assuming in many branches of industry. Emphasis, however, is laid on the fact that, as yet, the natural resins have held their own against the artificial product in the lacquer industry in which the particular requirements demanded are unusually exacting.

In many fields the synthetic or artificial resin has firmly established itself, sometimes to the complete ousting of the natural product. This is partly due to its possessing properties which render it pre-eminently suitable for certain purposes, and partly owing to the fact that it very frequently utilises, as its starting material, substances which are ready at hand as the cheap by-products of other industries. Abundant and inexpensive raw material is, indeed, fundamentally essential to the chemist for the success of his enterprise.

In one field, however, judging partly from the numerous patents for improvements and partly from an interesting article by Keyes, "Solvents and Automobile Lacquers" (*Ind. and Eng. Chem.*, vol. 17, p. 558 *et seq.*, June 1925) the natural resins would appear to be in no danger of having their supremacy challenged, at all events so far as the United States are concerned, despite the fact that no single one of them wholly meets the somewhat exacting demands made upon it by modern requirements. This industry is the lacquer trade, and while its needs certainly appear to be difficult to cater for, it is nevertheless worthy of special attention from the chemist on account of its very rapid growth.

Lacquers have leapt into prominence during the past two years, particularly in the motor industry in the United States, owing partly to the introduction of a new low viscosity nitro-cellulose (½-sec. viscosity as determined by the steel-ball method as against 60 to 80 secs. with the type previously in use) and partly to a better range of available solvents, softeners and plasticisers. According to the authority cited above, resin is included in a lacquer to confer on it properties which make the finished film resemble an oil varnish; that is to say, to give it gloss, brilliance, toughness and hardness, adhesion, body—without undue viscosity, and capacity for resisting moisture under all weather conditions. In addition it should be soluble in the complex solvents used in a modern lacquer, or in one which will blend readily with these without causing precipitation of any constituent, including the softeners or plasticisers which are essential for rendering the film tough and elastic and preventing "chippiness" and peeling on rise of temperature owing to differences in expansion and contraction between the lacquer film and the under surface. After dealing in detail with these essentials under fifteen headings, the author proceeds to discuss the defects of the natural resins. Soft resins (such as rosin) give a hard brittle film; medium resins (e.g., dammar) give a tough film lacking the necessary hardness; hard resins (such as kauri and congo) give a hard and tough film of the desired kind, but are soluble only with difficulty in solvents used for nitro-cellulose.

Solvent Constituents

Attention is then turned to the solvent. This consists essentially of three classes of constituents: (1) *Low Boilers*, with b.p. not above 100° C., which, owing to their high evaporation rate, facilitate quick drying, and also reduce viscosity enabling the lacquer to be sprayed; (2) *Medium Boilers* (b.p. ca. 125° C.) which assist the "flow" of the lacquer over the surface; and (3) *High Boilers* (150° to 200° C.) which prevent "blushing" and help to impart to the film a glossy, smooth, even surface, free from bubbles, blisters, "orange peel," "flow marks," etc. In addition a diluent such as benzene, toluene, or xylene, is frequently employed for thinning purposes, and also a "plasticiser" such as tri-cresyl-phosphate.

As a typical example of a modern lacquer the author cited above gives the following:

Solids, 15 to 25 per cent.

Nitro-cellulose (0·5 sec. R.S.) ..	40 to 60 per cent. of solids.
Resin (Ester Gum)	20 to 30 per cent. of solids.
Plasticiser (Amyl Phthalate) ..	50 to 60 per cent. of nitro-cellulose.
Pigments	5 to 25 per cent. of solids.

Liquids, 80–75 per cent.

Low Boilers ..	10 to 25 per cent. of liquids (Anhydrous Alcohol of Ethyl Acetate).
Medium Boilers	20 to 45 per cent. of liquids (Di-ethyl Carbonate).
High Boilers ..	4 to 10 per cent. of liquids (Ethyl Lactate).
Diluents.. ..	35 to 45 per cent. of liquids (Toluene).

The phenomenon known as "blushing," is the appearance of a whitish milkiness in the lacquer as it sets, which Keyes seems inclined to attribute to the precipitation of one constituent from solution due to its ceasing to be soluble after the bulk of the solvent has evaporated. One function of the plasticiser is to avert this catastrophe, as owing to its high boiling point (300° C.) it remains permanently in the film. According to Ludwig, "White Spots in Lacquer Finishing" (*Automobile and Carriage Builders' Journal*, June, 1925) this trouble is far more often due to spraying the lacquer on a moist surface than to any fault inherent in the lacquer itself. His slogan is "Don't seal in water," and he exhorts his readers to take due precautions in applying the lacquer. A view quite different from either of these is advanced by Stoppel (*A.S.T.M.*, Vol. 24 (1924), Part I, p. 453), as will be seen further on.

The Question of Solubility

Details of the solubility of artificial resins are conspicuous by their absence in most of the patent literature. Some light on the reason for this omission was obtained by the present writer from a paper by Drummond, "Synthetic Resins and Some Aspects of their Solubility" (*Oil and Colour Chemist*, March, 1925, Vol. VIII, No. 57, pp. 63–4). He points out that with "spirit solutions of soft copal, containing 50 per cent. copal, precipitation from a clear solution is obtained by *adding excess of alcohol*," and, again, that "when resin separates out from a mixture of oil and molten resin, a homogeneous solution may again be obtained by *adding more resin*," and quotes Tixier's dictum (*Moniteur Sci.*, 1906, p. 727): "It is not the resin which dissolves in the oil, but just the opposite when the resins are not thoroughly de-polymerised by heat." Drummond, therefore, uses a method for determining solubility which he ascribes to Wolff (*Farb. Zeit.*, 21 (1916), 198), and "determines the point of precipitation when water is added to the solution and expresses it (the solubility) as the number of c.c.s. of water producing turbidity when added to 9 c.c.s. of filtrate from a solution containing 3 grams of resin in 12 c.c.s. of 95 per cent. alcohol" or other solvent. To his table of solubilities he adds a column showing the "Solvent Power No." in which "the figures have been calculated in terms of c.c.s. of precipitating water per gram of solution," following the precedent of Mardles (*Trans. Far. Soc.*, 18 (1923), 318). From this it will be evident that to express the solubility of a resin in terms which will prove of value from the lacquer manufacturer's standpoint is not so simple or straightforward as would at first appear.

But to return to the direct consideration of the causes of the failure of the phenol-formaldehyde resins to gain an adequate foothold in the lacquer and varnish industry, and some of the attempts which have been made to render them more suitable for this purpose. The soluble types are, generally speaking, much inferior to the natural resins in water-resisting capacity and in their solubility in suitable solvents. The insoluble types in their finished state are brittle, frequently highly coloured, require stoving to a fairly high temperature to acquire their final properties, and also liberate water in the final setting which may cause "blushing" of the film.

The following are some of the methods whereby these undesirable qualities may be eliminated. The insoluble infusible resin may be reconverted into the soluble type, and be made soluble in linseed oil and other solvents used in varnish making, by simply heating it to a temperature of 240-270° C., with a natural resin such as colophony or with a soluble artificial resin, with or without the addition of an

acid catalyst. This observation by Dr. K. Albert forms the basis of the " Albertol " series of artificial shellacs, and the properties of the resins so obtained can be varied to a great extent by modifying the phenol used in the manufacture of the infusible resin, and also by using different natural or artificial resins as the soluble resin (Berénd, U.S. Pat. 1,259,347). The " Albertols " form the subject of an excellent review by Dr. Frydlender (*Rev. de Prod. Chim. 28e Ann.* No. 5, 145 *et seq.*), but his claim that a " whole gamut " of resins possessing *any desired* properties may thus be obtained would appear to be rather too wide in view of the many patents (notably those of the Society of Chem. Ind. of Basle) which are being taken out for still further modifying these products to enhance their value for certain purposes. It may here be of interest to note that the reverse process (i.e., the conversion of a natural soluble resin into an insoluble, infusible one) has been accomplished by heating it with 10 per cent. of its weight of hexamethylenetetramine (Br. Pat. 225,944).

A good example of the further modification of artificial or natural soluble resins, which seems capable of producing a wide range of different products, is afforded by Br. Pat. 221,205, in which a natural or artificial soluble resin is melted with an organic base, with or without a solvent or diluent, and beeswax, etc., or rubber added to increase the elasticity of the product. Among the examples given in this patent are Albertol Shellac K.6S, cautiously melted with alcohol and cyclo-hexanol, and commercial Albertol shellac melted with alcohol and α-naphthylamine and emulsified.

The product after such treatment must have arrived at a very high molecular complexity, possibly approaching that of naturally occurring proteid substances, and a reference to U.S. Pat. 1,245,981, Satow, may not be out of place. Satow agglutinises the proteid matter obtained from peas, beans, wheat, etc., with phenol, and then treats this mass with an active methylene compound to form an elastic lacquer. In the final hardening process, which takes place at room temperature, no water is liberated, according to his statements. To eliminate the stoving of phenol-formaldehyde resins at 160° C. to bring about the final hardening, an ingenious device is described by Filhol (U.S. Pat. 1,505,382). After condensing phenol (cresol, etc.) and formaldehyde in the presence of an alkaline condensing agent, he evaporates the mass to the required viscosity, first alone, and then again after the addition of ethyl alcohol, and then mixes the product with an acid ester, such as ethyl bisulphate, which he claims brings about the hardening at room temperature or at a temperature not above 45° C.

The Importance of Colour

Pale-coloured final products are especially desirable for use in lacquers. It seems to be fairly generally admitted that the colour of phenol-formaldehyde products arises by the action of the condensing agent on impurities in the starting materials, or from impurities actually formed in the reaction. Pollak (U.S. Pat. 1,369,352) uses pure materials and reduces his alkali condensation agent to 0·2 parts per 100 parts of crystallised carbolic acid employed, and then carefully washes out excess phenol and " leuco " products with water and dilute methyl alcohol, or destroys the impurities by oxidation with 3 per cent. hydrogen peroxide. The Amalith Co. (Br. Pat. 207,792) claim that by the addition of salts of phosphoric acid or boric acid to the reaction mixture, light-coloured products, fast to light, may be obtained. With regard to the suppression of the water formed in the final hardening, the Amalith Co. (Br. Pat. 207,791) claim that this may be effected by the addition of aromatic carboxylic acids or their alkali metal salts (benzoic acid, sodium benzoate and salicylate, for example), and, further, that in the presence of these substances solid transparent solutions are produced by the addition of cyclic hydrocarbons, mono- and polyhydric alcohols, abietic acid, natural resins (for example, pine resin), etc. The above are some of the suggestions which have been put forward to overcome the defects of the phenol-formaldehyde resins and render them more widely serviceable.

The question of water *within* the film of lacquer or varnish appears to be one of very great practical importance, and is discussed in detail by Stoppel in a paper on " Interpretation of the Water Test " (loc. cit.), in which he shows how the various tests of the American Society for Testing Materials (given briefly below) furnish evidence as to the durability of films of varnish. He advances the theory that water is to some extent soluble in the layer of varnish. Should it here encounter water-soluble substances, these are dissolved by it and exert osmotic pressure, thus increasing the tendency of water to penetrate the film. Precipitation occurs when this solution is no longer miscible with the surrounding varnish, and results in difference of refractive index and consequent " whitening " or " blushing." In support of this contention he asserts that varnishes whiten less in salt water than in fresh.

The Water Test

The proposed " water test " consists of immersion of a tin plate (about 31 gauge), measuring 3 in. by 5 in., and coated with a layer of varnish, which has been dried in air for 48 hours, in distilled water for 18 hours to a depth of 2½ in., and then observing (1) If whitening occurs; (2) if so, if it clears away within 10 minutes; (3) does not clear in 10 minutes but does so within 2 hours; (4) over two hours, but under 24 hours; (5) over 24 hours. According to Stoppel the water test indicates:

(i) Whether the beauty of the varnish will be destroyed by contact with water.

(ii.) The relative protection against moisture the varnish affords to the surface over which it is spread.

(iii.) Considered along with the Kauri Gum test, it gives a more reliable indication of durability.

Two other tests tentatively put forward are those of " Flash-point " and " Viscosity." The regular, fully-approved tests are as follows:

(1) General appearance.

(2) Colour test, compared against standards consisting of 1, 2, 3, 4, 5, 6 grams of pure potassium bichromate in 100 c.c.s. of pure concentrated sulphuric acid.

(3) Non-volatile matter, 1·5 gram of sample is placed in an 8 cm. dish and dried for three hours at 105-110° C.

(4) Elasticity and toughness test. The varnish is mixed with varying percentages of " Run-Kauri " gum in turpentine solution, coated on to tin plates 3 in. by 5 in., and these plates (after drying in air for one hour, baking at 95-100° C. for five hours and cooling 15 minutes to room temperature) are bent (film side outwards) over a 3 mm. rod. The percentage of Run-Kauri which the varnish will take without cracking under these conditions is an accurate measure of its durability.

The " Run-Kauri " gum solution is made as follows: Clear, bright pieces of Kauri gum are placed in a flask and heated until 25 per cent. of their weight has distilled over, when the thermometer in the flask should read 316° C. The residue in the flask is then cooled and broken up, and a portion dissolved in twice its weight of oil of turpentine, using only the fraction boiling 153-170° C. The percentages used in the above test are based on the weight of solids in the varnish, and a weight of Run-Kauri solution equivalent to 50 per cent. of the total solids gives a preliminary test. A varnish which stands this satisfactorily is then tried on 60 per cent. and 70 per cent. Run-Kauri; one that fails on the 50 per cent. is then tried on 40 per cent. and 30 per cent.

Though not intended to apply to lacquers of the type now under review, these tests may serve as some guide as to what is expected of a protective coating as regards flexibility and resistance to moisture, etc.

The American manufacturer is very wide-awake to the potential market in this country for automobile lacquers and varnishes, and at least two firms would appear to have launched campaigns to capture British trade, as is evidenced by the articles " Beckwith-Chandler Pyroxylin Automobile Finish " and " Valentine System of Automobile Finishing " (*Automobile and Carriage Builders' Journal*, April, 1925). Why cannot Great Britain supply her own needs in this respect?

"Mumetal" Nickel-Steel

In the report of Mr. Donald Campbell's paper to the Iron and Steel Institute at Birmingham, which appeared in the Metallurgical Section of last week's issue, reference was made to the use of " Mumetal " nickel-steel for cables. In place of *electric* cables, however, the report should have read *submarine* cables, for which it is claimed that Mumetal has the special advantages described.

The Problem of Dust Explosion in Industry

By W. E. Gibbs, D.Sc.

It will be remembered that Dr. Gibbs dealt with this important subject in his book "The Dust Hazard in Industry" (Ernest Benn, Ltd.), published recently. We give below an abstract from his paper on "Aerosols in Industry," presented to the meeting of the Chemical Engineering Group, held in London yesterday.

THE systematic study of matter in a colloidal condition has shown that the normal behaviour of a substance is greatly modified when the substance is reduced to a finely divided condition.

Electrical Character

The electrical capacity of any substance is proportional to the area of its surface, since any charge of electricity it may acquire will reside upon the surface. When any substance is disintegrated into dust, its surface area, and, therefore, its electrical capacity, is enormously increased, particularly if the dust be dispersed in air or in any other gas. When dust is blown about by wind it becomes charged electrically, the sign and quantity of the charge depending upon the nature of the dust and the electrical condition of the atmosphere. At the same time, the air—or extremely fine particles that are present in the air—becomes oppositely charged.

Dust may also become charged as a result of friction against a solid surface. In this way, electricity is developed in disintegrators and attrition mills by the friction between the particles of the material that is being ground and the parts of the machine itself. The fine dust that escapes from the machine is electrically charged. If the machine is not earthed, it, also, becomes charged, and, in favourable circumstances, particularly in very dry weather, discharge may occur with disastrous consequences. In practice, charges of over 10,000 volts can readily be accumulated. Such charges are frequently found upon the filter bags that are used to separate sugar dust from the air. These bags act as a kind of electrical machine, separating the positively charged dust from the negatively charged air. Similar charges have frequently been observed in threshing machines, in attrition mills, and in cotton gins. Unless steps are taken to prevent the accumulation of static electricity by humidifying the air, or by introducing suitably earthed collectors, there is every likelihood of the dust being ignited by a spark discharge.

Chemical Activity

A very important property of finely divided matter is its increased chemical activity. When a combustible is dispersed in air, the effective concentration of the combustible is enormously increased. When suitably ignited, a cloud of combustible dust—*e.g.*, sugar, starch, coal—will burn with an explosive violence comparable to the explosion of a gas mixture. The intensity of the explosion increases with the degree of dispersion of the dust. It is diminished by the presence of moisture or inert material in the dust. It increases with the concentration of the dust, passing through a maximum value at a concentration that corresponds approximately to the combining proportions of the dust and the oxygen in the air. Beyond an upper and lower limit of concentration the dust cloud will not propagate ignition at all. It varies, also, according to the oxygen content of the air. In some cases, the rate of combustion is accelerated by the presence of adsorbed oxygen upon the particles.

The Production of Aerosols

Many industrial operations produce a great deal of fine dust which accumulates in the surrounding air to form a persistent haze. Conspicuous examples of this are the drilling of the rock face in a mine, the grinding of substances such as cereals, sulphur, coal, in attrition mills and disintegrators, the disintegration of textile materials in cotton, linen and woollen factories. In all these operations, the dust is produced by the disintegration of various solid substances. In smelting and other furnace operations, and in the pouring of molten metal in the foundry, fumes are produced in large quantities by the condensation of vapours of metals or of metallic compounds that are formed in the hottest parts of the furnace and condense in the gases after they leave the furnace. In some cases, fume is formed by the chemical action between metal vapours and some constituent of the furnace gases—*e.g.*, SnO_2 fume from a tin-smelting furnace, and ZnO fume from a brass foundry. In most cases, the resulting aerosol contains particles ranging in size from fine dusts to smokes.

Frequently, it is desirable to separate the particles of the disperse phase from the dispersion medium, either to recover the disperse phase because of its value, or to purify the dispersion medium from an impurity that may be a public nuisance or that may be injurious to the workers who would inhale it, or that may endanger their lives if the dust should be explosive. This practical problem is beset with many difficulties, some of which are due to the high temperature or enormous volume of the gases that are to be handled. Here, however, we are concerned more with the difficulties that arise from the peculiar characteristics of the aerosols themselves.

Settling

The rates at which spherical particles of unit density will settle in still air are such that only particles larger than 10^{-3}cms. diameter can be removed effectively by settling processes, even when the serious practical difficulty of maintaining large volumes of gas in a still condition is overcome. To some extent, the efficiency of the settling process can be increased by submitting the aerosol to the action of centrifugal force, as in a "cyclone," or by reducing the distance through which the particles have to settle, which can be done by dividing the settling chamber into a large number of shallow compartments by means of horizontal partitions. In many cases, attempts are made to weight the particles with water, either by cooling the gas below its natural dewpoint, or by introducing water into the flue in a finely atomised condition in quantities sufficient to cool the gas and also to moisten the particles. Filtration methods can also be employed.

Electrostatic Precipitation

When a highly charged wire is fixed opposite to a flat plate at some distance from it, the intervening air space becomes highly charged with electricity of the same sign as the wire, whether it be positive or negative. The intensity of the field between the wire and the plate varies inversely as the distance from the wire. Of the gas ions or charged particles originally present in the air space, some will be attracted by the wire. As they approach the wire, their velocity will increase rapidly, owing to the increasing strength of the field, and if the voltage be high enough, their velocity will be so great that they will ionise the intervening gas and the wire itself by the force of their collision with the molecules of the gas and the wire. In general, the wire is negatively charged, so that it is the positively charged ions originally present in the gas that produce this ionisation by collision. The negative ions so formed are repelled from the wire, and travel rapidly towards the plate. Any gas molecules or smoke particles present in this intervening space become charged by these ions, and are, therefore, driven by electric force towards the plate. The suspended particles are also driven mechanically by the rush of ions from wire to plate.

Some fumes—for example, certain metallurgical fumes—have too high a conductivity, owing to their high degree of ionisation, so that it is practically impossible to maintain a high potential gradient across the treater. Such fumes have to be partially neutralised before they can be treated. Where a fume contains more than one dispersed constituent, differing appreciably from one another in volatility, it is possible to precipitate these constituents separately by taking advantage of this difference. Thus, when burner gases are treated while hot, the more refractory dust particles are precipitated. If the gases are then cooled, the arsenious oxide, which up to then has been present as vapour, condenses to a white cloud, which can then be precipitated separately.

A dust explosion is very similar to a gas explosion in its origin, its mode of propagation and its disastrous consequences. It constitutes an even greater industrial risk, because a cloud of explosive dust occurs much more frequently than an explosive gas mixture. The effect produced by an explosion

in a factory is very different from that produced in a mine. A factory building is not constructed to stand sudden pressures. Quite a small pressure causes the walls to collapse outwardly, and the building and its contents are wrecked and frequently burnt. In a mine, the explosion is confined by the walls, and rushes along the workings with increasing momentum. It is surprising to find how many dusts that ordinarily are being raised in clouds every day, are explosive; it has been shown that explosion is possible with over forty, of which the most readily inflammable are dextrin, sugar, starch, flour, coal, sulphur, aluminium, wood flour, rice meal, cork, unextracted soya bean, malt, and tea.

Explosion Pressure

The " expansion pressure " that is developed is due either to the rapid formation of gaseous reaction products, or to the expansion of the air by the heat of the reaction. The pressure that is produced by an explosion of starch dust is mainly due to the rapid formation of relatively large volumes of gases. Sulphur, on account of its low ignition temperature, explodes more readily than starch, but, since it produces only half the volume of gas that an equal weight of starch produces, it explodes with correspondingly less violence. With some dusts—*e.g.*, aluminium—that do not produce any gas, but, on the contrary, use up oxygen from the air, the explosion pressure is due entirely to the thermal expansion of air. The heat of reaction of aluminium dust is so great that the explosion pressure is of the same order as that produced by starch.

Combustion is retarded by the presence of inert matter—*e.g.*, inert gas, moisture, ash—which absorbs some of the heat of ignition. Coarser particles, also, ignite less readily and, at a given concentration, communicate heat to one another with more difficulty than fine particles do. The temperature of ignition of a given cloud varies considerably, according to the temperature and thermal capacity of the source of ignition. In most cases the cloud will be ignited more easily—*i.e.*, at a lower temperature—by a large source of relatively low temperature—*e.g.*, an oil flame, than by a small source of higher temperature—*e.g.*, an electric arc. Radiation from the larger source warms the surrounding dust particles, and thus facilitates the spread of ignition.

An explosive dust cloud in a factory may be formed gradually by the continual leakage of dusty air from an attrition mill or disintegrator, or from a conveyor or elevator housing, or it may be formed suddenly by the fall of accumulated dust from a girder. In a coal mine, dust is always present on the floor and walls of the workings, and is constantly being raised by traffic and circulated by the ventilating current. A dust cloud in a factory may be ignited in many ways. In coal mines, ignition is generally due to the firing of a shot, either with an excessive charge or with a charge tamped with coal dust instead of clay, or the shot may fire into a pocket of gas.

Methods of Prevention

Certain general precautionary measures should be in force in any factory in which an explosive dust is produced, in order to prevent the formation of a dust cloud and to eliminate all possible sources of ignition. In wood-working plant, disintegrators, grinding and screening plant, dust should be removed as it is formed by suitable suction hoods that are set as close to the work as possible, and are connected through a piping system to an air filter and exhaust fan. Where possible, milling machines should be of the totally enclosed type or housed in a dust-tight enclosure or room from which the dusty air is extracted by a fan. Dust should be prevented from accumulating on ledges or girders by keeping the surroundings of the plant free from dust by frequent suction cleaning. It is impossible to prevent the continual formation of a dust cloud inside a mill or disintegrator and in conveyors, elevators and bins. Such a cloud may be ignited by sparks caused either by pieces of iron passing into the mill with the feed, or to the grinding of the bare stones against each other, owing to the stoppage of the feed. Iron should be removed from the feed by a magnetic separator, and the mill should be so arranged that if, for any reason, the flow of the feed either to or from the mill is stopped, the mill stops or the grinding surfaces are automatically thrown apart.

In all cases, of course, the use of open flames should be rigidly forbidden. Only specially enclosed and protected electric incandescent lights should be permitted. Also, specially enclosed motors, switches and fuse boxes should be installed, so that the danger from electric sparks or arcs is eliminated. We have seen that, if an inflammable dust cloud be mixed with sufficient inert gas or inert dust, it ceases to be inflammable. Inert gas (flue gas) has been used successfully in mills, conveyors and elevators to prevent combustion, and inert dust (stone dust) is widely used to prevent the spread of a dust explosion in coal mines. By reducing the oxygen concentration to below 12 per cent. most dusts are rendered harmless.

In coal mines, stone dust, finely ground shale or precipitated chalk is scattered liberally upon the coal dust along the workings. It is also contained in trays and boxes that are suspended overhead at the entrance to the different sections of the mine. These boxes are tripped up by the pioneering wave, and discharge their contents into the dust-laden air, so that, when the flame comes, it is quenched. Stone-dusting possesses a marked advantage over watering in that the effect is relatively permanent (no evaporation), and, owing to the whiteness of the dust, it is possible to see at a glance whether the mine is properly treated. The use of stone dust has been suggested to prevent the spread of explosion in conveyors, the dust being contained in a magazine that is situated above the conveyor housing and is connected with a flap damper in such a way that the displacement of the damper by the pioneering wave releases the inert dust, which falls in a cloud into the conveyor housing. The spread of explosion in an enclosed piping or conveyor system can be prevented by the use of explosion dampers, in conjunction with a suitable vent pipe. Where these precautions are observed, it is unlikely that a dust explosion will occur, or even attain serious proportions.

Sugar Beet Possibilities for Chemists

THE report of a Special Committee appointed to prepare an educational scheme for the training of specialist technical officers for beet sugar factories has now been published, and was unanimously adopted by the British Sugar Beet Society's committee at their last meeting.

In the course of the report the Committee recommends that the factory companies should be advised to give preference in appointment to vacancies in all or any technical posts to applicants holding the diploma in beet sugar technology, to be obtained under the scheme for the training of specialist technical officers outlined in the report. The basic principle of the scheme is that between the preliminary and advanced courses at the University or other approved institution there is a course of practical experience and training in a beet sugar factory during the manufacturing season. The training would occupy about two years, the first and third terms being occupied in special lecture courses at a university or other approved institution. In the second term the student attends the factory as an unpaid technical volunteer. His business is to observe and study factory operations, combined with laboratory practice. He will work side by side with the men, and will be under the authority of the factory manager. He will spend at least a week at each station in the factory. He will keep, as far as the manager will allow, a diary or log book, and enter certain particulars daily.

At the close of the campaign the diary would be sent to the university or other approved institution, excluding information which is confidential to the factory. At the conclusion of the third term the student obtains the Diploma in Beet Sugar Technology.

Double Helical Reduction Gears

A BOOKLET of considerable interest to engineers and all concerned with economical plant working has just been published by Crofts (Engineers), Ltd., Thornbury, Bradford. It deals with double helical reduction gears and gives the range covered by their standard cases with the dimensions and powers transmitted at various speeds. All plant is illustrated, and a typical instance is a centrifugal pump drive from an internal combustion engine with increasing speeds from 275 to 1,450 r.p.m., transmitting 200 h.p., and fitted with pressure feed lubrication to gears. Worm reduction gears are also illustrated in this booklet, which is essentially straightforward and practical.

Reviews

CELLULOSE ESTER VARNISHES. By F. Sproxton. London: Ernest Benn, Ltd. Pp. 178. 15s.

It would appear that the somewhat scanty literature dealing with the technology of paints and varnishes is to be suitably augmented by the series of monographs edited by Dr. R. S. Morrell, and there can be no question that the present volume on *Cellulose Ester Varnishes* has appeared at a most opportune moment. Much has appeared recently in technical journals of various kinds regarding the advantages which "cellulose finishes" have over the "old-fashioned oil finishes," and that which has thus appeared is only a slight manifestation of the vast amount of thought and time that are being given to considering the relative merits of the two types of "finishes" and the possibilities that the future may hold regarding them.

It is true that in view of Worden's immense volumes on the derivatives of cellulose it may not be wholly correct to refer to the literature on cellulose ester varnishes as "scanty," nevertheless we have no hesitation in saying that there was a distinct need for such a volume as that of Sproxton. The author is to be congratulated upon the production of a most useful book. It may be described as being eminently "practical." Proper, but not undue, weight is given to theoretical considerations. It is obviously written by one who fully appreciates the pitfalls which beset many young academic chemists brought into contact with industry. In Chapter I an attempt is made to give general ideas regarding the composition and properties of cellulose ester varnishes, and their development is sketched in brief outlines from the investigation of Pelouze in 1838 to the present day. There follows a very short chapter on the chemical constitution and structure of cellulose, considered only in relation to the esters and their solutions. The next two chapters describe the manufacture of cellulose nitrate and acetate respectively in just sufficient detail that the varnish maker may the better understand the properties and the vagaries of his raw material.

Chapters V and VI on "Some Properties of Cellulose Ester Solutions" are probably both the best written and the most important in the book. They provide an excellent survey of the properties of these solutions which appear to be most nearly related to their use as varnishes. The reader is thus well fortified for an intelligent understanding of the second half of the book which deals with the manufacture and application of the varnishes. The author probably shows sound discrimination in deciding that "the nomenclature of colloid chemistry is not yet quite firmly established"; colloid terms are used but little throughout the book. At the same time doubt may be expressed whether we are always quite clear as to the exact meaning to be attached to some "non-colloid" terms when dealing with such a complex subject as the solubility of cellulose esters or of resins—e.g., the use of the term "solvent power" and Knoevenagel's conclusion that swelling is due to "chemical action." These chapters conclude with a critical examination of the views put forward by Esselen, Knoevenagel, Mardles, and others, regarding the nature of cellulose ester solutions, and many lines are pointed out along which investigations should be made. It is suggested that much of this work could best be done in academic research laboratories. In the next chapter, which begins the discussion of varnishes as such, the remarks on the "application of laboratory results" are very apt and refer specifically to the subject under discussion. Although the list of commercial solvents, with their specifications, is fairly long, it might, with advantage, have been extended and the solvents classified better with regard to their behaviour in cellulose ester varnishes. The term "softening agent" is abruptly introduced while describing certain solvents, but it is not explained and very few plasticisers are described. Description of the manufacturing processes of mixing, clarification and grinding is rather short, but contains many hints, rather than explicit directions. These, however, should prove useful to the trained scientist who also possesses either factory experience or a broad-minded, common sense outlook. We are sorry that more was not said regarding the relative merits of acetate and nitrate esters, but we look forward to reading this in a second edition which we feel sure will be called for in due course.

H. H. M.

BLACKS AND PITCHES. By H. M. Langton. London: Ernest Benn, Ltd. Pp. 179. 15s.

There would appear to be more arguments against the inclusion of black pigments in a monograph dealing with pitches and bituminous substances than may be advanced in favour of such a scheme. Probably questions of expediency determined the arrangement. This volume contains much information drawn from a wide range of recent technological literature, published in various journals, bulletins, etc., and should prove useful to chemists entering the oil and colour industries. References and a bibliography are given at the end of each chapter. The first part of the book deals with all of the black carbonaceous pigments—including graphite; their production, properties and uses, their application to the manufacture of paint, ink and rubber goods, and methods of analysis and testing. Black lake pigments are not included.

The manufacture of carbon black is described in some detail and its use in printing ink manufacture and as a rubber pigment briefly outlined. In the chapter on lampblack it is rather a pity that so little prominence is given to the term "vegetable black"—a term which according to present-day usage is of equal importance to that of lampblack. In the chapter on black paints a British standard specification for carbon black is given, but it should have been stated that this refers only to the use of that pigment for mixing with nitro-cellulose varnish. In addition to the native asphalts and asphaltites, the pitches resulting from the distillation of petroleum, tars, fatty matter, etc., are described at some length. The paucity of recorded facts concerning the weathering and ageing of bituminous materials is surprising and the short chapter on this aspect of the subject indicates how little we know of the physical and chemical changes that take place under conditions of exposure. The remaining three chapters contain some useful information regarding the use of bituminous materials, etc., in the coating of fabrics for roofing and insulating purposes, in the manufacture of paints and "Japans," and in the preparation of paving materials.

H. H. M.

PRINCIPLES AND PRACTICE OF INDUSTRIAL DISTILLATION. E. Hausbrand. Translated by E. H. Tripp. London: Chapman and Hall. 300 pp. 21s.

The physical process of distillation has so many applications in the chemical industry that a volume devoted to its principles and practice is certain of a wide reception. The first part of the book deals with the theory of distillation in its relation to apparatus, and contains a discussion of condensers, boiling columns, continuous distillation plant, etc. In addition there is a chapter on the actual construction of apparatus. A synopsis is also included of the chief equations required in calculating the data obtained during distillation operations, by way of a preface to the second part of the book, which illustrates these methods by detailed examples relating to the separation of eleven pairs of substances, such, for example, as acetone and methyl alcohol, nitrogen and oxygen, and water and nitric acid. Coupled with over a hundred pages of tables, illustrated by charts, the whole combines to produce a practical work which should be of much use to those engaged in distillation processes, whether on a research or an industrial scale.

J. A. B.

DIE ALLGEMEINHEIT DES KOLLOIDZUSTANDES. By Prof. Dr. P. P. von Weimarn. Second Edition. Translated from Russian by Dr. A. Kuhn. Dresden and Leipzig: Steinkopff. Pp. 504. Price 25 marks.

The volume is based on the idea that the colloid state is a fundamental property of matter and that bodies can at will be obtained in either colloid or crystalloidal modifications, and that all crystalloidal matter can be transferred quantitatively into the world of colloids. This idea is illustrated by means of numerous experiments, most of which are easy to reproduce in an ordinary laboratory, and is facilitated with the aid of 134 illustrations and numerous tables. A substantial part of the volume is devoted to the history of colloid chemistry. The writings of von Weimarn have already had considerable influence on the study of colloids and the simplification of the whole subject. It is a book which should be read by every progressive chemist.

S. P. S.

Heavy Chemicals and Tar Products

Evidence before Government Committee

THE Committee on Industry and Trade met under the chairmanship of Sir Arthur Balfour at the Board of Trade offices on Tuesday. It was reported to the Committee that the sale of their *Survey of Overseas Markets*, published through the Stationery Office last July, had been satisfactory. It was also mentioned that the volume is being studied and used in a number of foreign countries, and the Committee expressed the hope that it would be utilised to the fullest possible extent by British manufacturers and traders in the furtherance of their business. It was stated that a considerable number of British firms are already making extensive and frequent practical use of the information in the volume.

The Committee discussed the arrangement of their further work, with a view to concluding the hearing of evidence by the end of the year, if possible.

Evidence from the A.B.C.M.

Evidence on behalf of the Association of British Chemical Manufacturers was given by Mr. W. J. U. Woolcock, the general manager of the Association.

Mr. Woolcock, dealing first with the general position in regard to heavy chemicals and tar products, said that, speaking generally, in this main group, either because of the nature of the chemicals, or the presence of the raw materials in this country, or the superior organisation of the methods of production, manufacture had developed and remained in this country. With the aid of cheap fuel and other advantages, an early lead was obtained in manufacture. Certain of the Continental countries, and notably Germany, were reducing this lead in pre-war days, and while in this country these industries were mainly operated as independent manufactures, in Germany they were merely basic units in the larger undertakings. In the production of alkali, the proximity of salt, limestone and coal, coupled with the genius and perseverance of the founders of the industry more than a century ago, enabled this country to secure a great advantage. Continuous progressive research and subsequent developments had maintained the position thus secured, both in markets at home and abroad.

The nature of sulphuric acid precluded a large volume of export or import. The production in this country was, therefore, mainly for home consumption, and there was little to fear from outside competition in the sale of acid as such. In the case of secondary products, in which acid was a primary raw material, foreign competition was of the first importance, and had already gone far to kill the British superphosphate industry. In the manufacture of the acid the cost of the raw material, whether spent oxide, pyrites, or sulphur, and the efficiency of the plants and the consequent cost of production were of vital interest to other branches of chemical industry in which sulphuric acid was a fundamental raw material.

Coal Tar

This country, Mr. Woolcock continued, was the first to develop the production of coal tar on the large scale, and for many years was unchallenged in this field. Large quantities of primary tar products were exported, because the home demand for the refined products did not develop at as great a rate as in Continental countries which were building up their dyestuffs industries. The British producers of primary tar products were at first dependent on the gas industry for their raw material. The recovery of the by-products from coke ovens had, however, led to increases in the world production of tar, particularly in those Continental countries where the manufacture of steel had developed rapidly. In all countries, the normal practice was for the tar products industry to operate as a separate branch of chemical industry.

Dyestuffs and Fine Chemicals

Dealing with dyestuffs, intermediates, and fine chemicals, Mr. Woolcock said that the distinguishing features of the chemicals in this group were the enormous number of the different products, the comparatively small quantities in which most of them were made, their relatively high cost of production, and the great degree of scientific skill required for their manufacture. They also differed materially from the other group in that the attempt had been made to maintain their production in this country by two different methods of protection now in operation. He then dealt with the three methods of protection which had been tried—subsidy; total prohibition of imports except under licence; and Customs duties.

With regard to the Dyestuffs Act, the witness said that the machinery set up by the Act had worked quite well, mainly because there was on the side of the users of dyestuffs a very efficient Colour Users' Association. It was when the products which it was desired to protect were used by a great number of unorganised concerns that the method of prohibition and licence was likely to fail. The Safeguarding of Industries Act, 1921, adopted the method of protection by means of tariff. Here it was desired to protect a variety of scientific industries, the products of which went to an even greater variety of consumers. He claimed that after three years' working it had been proved that Part I of the Act (relating to Key Industries) had been useful in establishing in this country the fine chemical industry.

Foreign Competition

Mr. Woolcock dealt also with the general question of foreign competition, and the main causes which made such competition formidable; the export trade in chemicals and the special difficulties encountered in various markets; the serious effect on the home industry of the prevailing heavy local rates and high taxation; the efficiency and cost of transport as affecting the chemical industry; and the position and functions of merchants. In conclusion, he gave two or three interesting examples of the improvement and development of processes which had taken place, particularly in the fine chemical and dyestuffs sections of the industry. In this connection he referred particularly to insulin, pure medicinal glucose, laboratory chemicals, alkaloids, and the production of anthraquinone dyestuffs in soluble form.

"Alternate Effects"

To the Editor of THE CHEMICAL AGE.

SIR,—In speaking at a recent discussion on "alternate effects," at the British Association in Southampton, I pointed to a little picture for which I had myself been originally responsible, remarking that it was "not a theory at all but a mere mnemonic." A later speaker made it clear that the incidence of my observations had been understood by at least one person who heard them.

Your reporter, however, was evidently under the impression that I was applying those observations to Dr. Flürscheim's theory. The distinction between the two versions may seem unimportant to anyone but myself; nevertheless, I trust that my own may have the same publicity as the other.—Yours, etc.,

Manchester. October 7, 1925. ARTHUR LAPWORTH.

Training for Chemical Engineering

To the Editor of THE CHEMICAL AGE.

SIR,—In reply to "A Chemical Student's Inquiry" in your issue of September 26 last, a student who has only graduated in chemistry is not fitted to enter the chemical engineering profession without some further academic training in engineering and especially in chemical engineering. That can be obtained at several Institutions, notably the Imperial College of Science and Technology, South Kensington; University College, London; and Battersea Polytechnic, London. Chemical engineering instruction of limited scope is also provided at Manchester, Leeds, Sheffield, Glasgow, Edinburgh, and possibly other centres.

For a student to make his mark as an eminent chemical engineer, it is desirable that he should do some chemical engineering research before entering industry. It is possible by attending such an institution as Battersea Polytechnic for a really capable man to learn to add to his chemical experience such chemical engineering knowledge as may fit him for a better position, but it is desirable and generally necessary that a post-graduate course should be taken to secure the best training.

The prospects of finding a situation in the coal tar distillation industry in this country, are excellent. One may take it that good chemical engineers are always in demand.—Yours, etc.,

October 3. CHEMICAL ENGINEER.

Dye Production in 1924

Detailed Figures of U.K. Dyes

THE Board of Trade have received from the Dyestuffs Industry Development Committee the following statement showing the quantities of the various main classes of dyes which were produced in the United Kingdom during the year 1924. The statement has been prepared by the Committee from returns furnished voluntarily by the principal British dye makers, and, though it is not comprehensive, the combined output of the few firms which did not make returns was relatively negligible. The figures in all classes represent the production in market types.

Category.	Blacks. Lb.	Blues. Lb.	Browns. Lb.	Greens. Lb.	Oranges' Lb.
Direct Cotton Colours ..	2,017,314	934,357	412,621	134,890	178,135
Acid Wool Colours	1,234,398	1,043,242	92,690	339,051	519,725
Chrome and Mordant Colours (including Alizarine)	1,060,222	648,129	909,849	113,667	550,946
Basic Colours	11,809	290,422	135,152	111,109	125,100
Sulphur Colours	6,608,022	200,510	679,069	143,415	8,378
Vat Colours (including Indigo)	67,678	4,632,752	8,915	2,253	32,051
Dyestuffs for Lake Making	—	127	—	52,702	—
Oil, Spirit and Wax and Miscellaneous Colours ..	506,511	256,478	61,321	710	21,349
Total..	11,505,954	8,006,017	2,299,617	897,797	1,435,684

Category.	Reds and Scarlets. Lb.	Violets. Lb.	Yellows. Lb.	Total. Lb.
Direct Cotton Colours ..	595,561	46,447	739,759	5,059,084
Acid Wool Colours ..	860,705	195,425	907,238	5,192,474
Chrome and Mordant Colours (including Alizarine)	3,237,713	14,102	405,635	6,940,263
Basic Colours	337,469	352,844	197,495	1,561,400
Sulphur Colours	105,778	—	87,737	7,832,909
Vat Colours (Including Indigo)	69,956	108,646	81,462	5,003,713
Dyestuffs for Lake Making	697,124	—	4,513	754,466
Oil, Spirit and Wax and Miscellaneous Colours ..	21,633	4,208	26,185	898,395
Total..	5,925,939	721,672	2,450,024	33,242,704

A New Local Anæsthetic

IT will be remembered that a cocaine substitute was the subject of a question in the House of Commons on August 6 last when Mr. Day asked the Minister of Health if his attention had been drawn to the discovery by Dr. A. J. Copeland of a new anæsthetic of this nature. Particulars of this compound are now forthcoming from a pamphlet on "Borocaine," just issued by the British Drug Houses, Ltd. It is claimed that Borocaine is in all respects a substitute for cocaine, over which it possesses important advantages, inasmuch as it is non-toxic, non-irritant, non-habit-forming, and is outside the scope of the Dangerous Drugs Act. It is the outcome of the researches of A. J. Copeland and H. E. F. Notton, carried out at the University of Cambridge with the help and advice of Professor W. E. Dixon and Professor Sir William Pope, on the pharmacological and chemical sides.

As the result of an extended series of experiments, it was found that the borate is the best salt of any anæsthetic alkaloid, and that ethocaine is the most suitable base to combine with boric acid for general use. Borocaine is the borate of diethyl-amino-ethyl-para-amino benzoic acid (ethocaine) and is stated to be more than twice as powerful as a surface anæsthetic. It is a stable, white, crystalline powder, freely soluble in cold water, an aqueous solution having a P_H value of about 8.0; that is, it is on the alkaline side of neutrality.

Prospects for Superphosphates

PRESIDING on Tuesday, in London, at the general meeting of Lawes Chemical Manure Co., Mr. G. Cubitt said that the manufacture of superphosphates had become so unprofitable, owing to Continental competition, that manufacturers had petitioned the Board of Trade to appoint a committee to consider whether the industry was entitled to relief under the Safeguarding of Industries Act. The chairman reported that a case for relief had been made out, but the other two members reported adversely. The company was not so dependent as formerly upon its superphosphates trade. During the past year it had manufactured superphosphates to a limited extent only, and the directors intended to continue that policy until the position became favourable or until they were forced to the conclusion that it was no longer worth while keeping the superphosphate plant in working order.

The Maclaurin Fuel Process

Mr. Stanley Baldwin at Glasgow

THE Premier when visiting Glasgow on Friday, last week, requested to be shown over the Maclaurin smokeless fuel plant which has been installed at Dalmarnock Gas Works. The picture, which shows Mr. Stanley Baldwin talking to Mr. Maclaurin, is reproduced by courtesy of the *Glasgow Record*. The plant was described in detail in THE CHEMICAL AGE of September 19, and recent tests showed that certain coals yielded about 55 per cent. smokeless fuel after treatment, but the proportion varies with the kind of coal used.

In the upper regions of the producer oils are given off and pass upwards through the fuel at gradually decreasing temperatures. Little decomposition therefore takes place and instead of benzenoid coal tar, a highly phenolic crude oil is obtained.

Reported New Carbonisation Process

PARTICULARS were published this week in a northern journal of a new method of low temperature coal carbonisation known as the Marshall-Easton process. An offer of £59,000, it is stated, has been made for the American rights, and various countries, including Germany, are said to be making inquiries. The Prime Minister has been informed of the scheme, which has been passed on to the Mines Department. From a rather general statement by Mr. T. T. Broad, ex-M.P. for the Clay Cross Division of Derbyshire, one of the main effects of the method is to reduce the carbonisation period from over seven hours to about two-and-a-half.

The claims for the new process are given in general terms. It is stated, for example, that, under the new process, one ton of coal will yield 5,000 cubic feet of rich gas (800 British thermal units), 24 gallons of oil, and 1,568 lb. (14 cwt.) of good quality coke, suitable for domestic use. The oil yield produces 16 gallons of heavy oil, and four gallons of petrol. In addition, 20 lb. of sulphate of ammonia are obtained. The coke may be used to produce water gas, which, mixed with the 5,000 cubic feet of rich gas, gives 40,000 cubic feet of gas suitable for the generation of electricity. By carrying out the process at the pit-head, it is estimated that electricity could be produced at less than ¼d. per unit, permitting of its being sold for lighting purposes at 1d. per unit. It is estimated that a plant to deal with 300 tons of coal per day would cost £46,000. A feature of the process is that it is claimed to give the above results from slack coal. The estimated value of the by-products from a ton of slack treated by the Marshall-Easton process is £1 15s.

Recent Wills

Mr. Sidney Hill, of Hull, chief managing director of Blundell, Spence and Co., Ltd., paint manufacturers, of Hull and London (net personalty £2,784) £10,395

Dr. Francis Robert Japp, F.R.S., of Richmond, late Professor Emeritus of Chemistry, Aberdeen University, and Vice-President of the Institute of Chemistry, 1901-4 (net personalty £522), gross £1,690

Mr. Samuel Jackson, of Bingley, Yorks, analytical chemist, formerly with Binny and Co., Madras (net personalty £16,987) £17,871

Mr. Leonard Ellerton Vlies, of Manchester (net personalty £10,548) £12,321

From Week to Week

A NEW COUNTY MAGISTRATE for Derbyshire is Mr. F. Hadfield, bleacher, of New Mills.

AN ALLEGED NUISANCE caused by fumes at Grays Dye Works is to be investigated by Grays Council.

EXPERIMENTAL PRODUCTION OF ARTIFICIAL SILK has been commenced at the Celta Works of Kemil, Ltd., Fletton, Peterborough.

THE ELY BEET SUGAR FACTORY will be opened by the Minister of Agriculture and Fisheries, Mr. E. F. L. Wood, on Thursday, October 15.

NEARLY 10,000 VISITORS have already been recorded at Port Sunlight this year, and this figure is thought to be probably a record for an industrial undertaking.

MR. W. J. U. WOOLCOCK has been elected an honorary member of the Chemical, Metallurgical, and Mining Society of South Africa for the year ending June 30, 1926.

THE THIRD PRIESTLEY LECTURE was delivered on Wednesday under the auspices of the Birmingham and Midland Institute Scientific Society, by Dr. F. W. Aston, of Cavendish Laboratory, Trinity College, Cambridge, on "Isotopes."

LONG SERVICE AWARDS were presented to over 530 employees of Lever Brothers and R. S. Hudson, Ltd., at Port Sunlight, on Friday, October 2 by Lord Leverhulme. One of the recipients of a twenty-five years' service award was Mr. C. W. Barnish, a director of Lever Brothers.

MR. T. R. HEWLETT, chairman of the Anchor Chemical Co., Ltd., Clayton, Manchester, was presented on Monday with a silver centrepiece by the directors, staff and workpeople of the company to mark his 70th birthday. The presentation was made by the oldest employee, Mr. A. Reid, who is now a director of the company. For a number of years Mr. Hewlett has been a member of the Manchester City Council, and in 1923 was appointed a magistrate.

INCLUDED IN THE LIST OF CARGOES at Middlesbrough in a report presented to the Conservancy Commissioners was a cargo of 4,469 tons of creosote for shipment to Savannah, U.S.A. A considerable export business is done in this product, America taking supplies for timber preservation. Specially designed tank steamers, the largest having a capacity of 8,000 tons, are employed, and last year 60,603 tons of creosote oil was exported from the Tees, including no less than 57,005 tons to the U.S.A.

PROFESSOR H. E. ARMSTRONG left on Tuesday for Paris, where he attended the fifth annual congress of the "Société de Chimie Industrielle" and the special Chevreul celebrations, to represent the Royal Society and the Chemical Society. Other British scientists present were Sir Edgar C. Evans, Dr. F. D. Chattaway, Sir Robert Hadfield, Dr. H. Levinstein, Dr. Stephen Miall, Sir Frederick Nathan, and Sir William Pope. A special report of the proceedings will appear in THE CHEMICAL AGE next week.

AT THE CONVERSAZIONE of the Institution of Petroleum Technologists held in London on Tuesday, Sir Thomas and Lady Holland received the guests. There was an exhibition of testing apparatus by Baird and Tatlock, A. Gallenkamp and Co., Negretti and Zambra, Cambridge Instrument Co., J. Orme and Co., Townson and Mercer, and the Lovibond Tintometer. A model was also shown of the drilling rig which has been presented to the Petroleum Technology Section of Birmingham University by the European Oil Industry Supply Co., Ltd.

AT THE ANNUAL GENERAL MEETING of Rubber Roadways, Ltd., in London, on Monday, it was stated that recently over 70 patents had been taken out and three companies had been formed to exploit rubber as a road material. Experiments had been generally satisfactory and the "Gaisman" patent process was to be tried in London shortly. The "Leyland" and "Cowper" systems were being further tested. In America experiments were being carried out to produce a light coloured rubber block for the "white line" in roadways.

THE FOURTEENTH ANNUAL CONFERENCE of the British Commercial Gas Association is to be held in Plymouth on Monday, Tuesday and Wednesday, October 19, 20 and 21, and will open with a reception by the Mayor at which Dr. C. W. Saleeby will lecture on "Sunlight and Health." At the public conference on the concluding day the speakers will include Professor J. W. Cobb, Pro Vice-Chancellor of Leeds University, on the conservation of our coal resources. The effect of smoke on agriculture and horticulture will also be a subject for discussion.

THE WINTER SESSION of the Institution of Chemical Engineers will open with a reception to meet the new president, Sir Frederic Nathan. This will be held on Wednesday, October 14, at the Science Museum, South Kensington, S.W.7, entrance in Imperial Institute Road. Scientific meetings will be held once a month so far as is possible. A number of subjects, such as Refrigeration, Filtration, Magnetic Separation, the Utilisation of Research Workers in Industry, will be discussed. The Institution will also participate with the Chemical Engineering Group and the Yorkshire Section of the Society of Chemical Industry in a further discussion on "Smokeless Fuel," to be held in Sheffield later in the year.

MR. J. B. AIM, aged 91, formerly paint manufacturer, of J. and J. Aim, Port Eglinton, Glasgow, has died at New Milton, Hants.

A PRACTICAL SCHOOL OF DYEING for Paris was proposed at a congress of the French Chemists' Association of the Textile Industry last week.

MR. ARTHUR PUGH, general secretary of the Iron and Steel Trade Federation, has been appointed chairman of the Trades Union Congress for the coming year.

DR. HERBERT LEVENSTEIN is a prospective candidate for the Didsbury division in the Manchester municipal elections, and Mr. Cundiff is to stand for Longsight.

A CONFERENCE OF SCOTTISH LOCAL AUTHORITIES is proposed to represent to the Government the need of bringing up to date the existing legislation regarding the storage, use, and conveyance of petroleum, as it is considered that the existing Acts are inadequate.

THE KING has conferred on Mr. Joseph Clifford, Laboratory Chemist in the Egyptian State Chemistry Department, authority to wear the Insignia of the Fourth Class of the Order of the Nile, conferred on him by the King of Egypt in recognition of valuable services.

FREE LECTURES ON ARTIFICIAL MANURE RESEARCH at Rothamsted will be delivered during the winter by Mr. H. V. Garner to interested bodies. All communications regarding these lectures should be addressed to the Secretary, Rothamsted Experimental Station, Harpenden.

A FIRE broke out on Monday night at the works of M'Phersons, paint and varnish manufacturers, Old Trafford, Manchester. The fire brigade found a tank of resin ablaze, but they managed to confine the outbreak to the tank and a portion of the roof, serious damage being averted.

MR. G. F. HORSLEY, who left early in July for Valparaiso to take up his appointment as Director of Research to the Nitrate Producers' Association of Valparaiso, has appointed Mr. M. B. Donald, M.Sc., A.M.I.Chem.E., as one of his senior assistants at Antofagasta. Other appointments will follow when the exact requirements are known.

A "SAFEGUARDING" COMMITTEE has been appointed by the Board of Trade to inquire into and report upon an application for the imposition of a duty upon cutlery made by the Sheffield Cutlery Manufacturers' Association. All communications should be addressed to Mr. G. S. Bailey, Board of Trade, Great George Street, London, S.W.1.

SIR ERNEST BENN, with his mother, Elizabeth Lady Benn, and his eldest daughter, Miss Betty Benn, returned to England by the "Empress of Scotland" on Wednesday, after a tour of some weeks in the United States and Canada. His second son, Mr. Edward G. Benn, who went out with him, remains in New York on the staff of the *New York Times*.

THE LOPULCO PULVERISED FUEL SYSTEM, the rights of which belong to International Combustion, Limited, of London, is to be installed in a new works of the Berlin Electric Light Works on 12 large boilers. This order has been secured in face of the most exacting investigations by the German engineers into all known continental and American systems of pulverised fuel.

AN ANGLO-SOUTH AMERICAN ASSOCIATION has been formed, with offices at 25, Haymarket, London, S.W.1, for the promotion of British Trade in South America. It has the support and co-operation of some of the most prominent business men in the country, and among those who have already promised to be vice-presidents is Sir Robert Hadfield. The Association desires to draw the attention of the British manufacturer and trader to the untouched possibilities of the 17 South American Republics, and all details can be obtained from the offices.

DESPITE KRUPP'S WITHDRAWAL from the proposed fusion of the Rhenish-Westphalian iron industry, the four remaining concerns —the Phœnix Co., the Rhein-Elbe Union, the Rheinstahl, and the Thyssen Co.—have decided to go on with the scheme. The companies will be united under a holding company with a capital of about 500,000,000 marks. Krupp's are reported to have issued an official denial of recent statements to the effect that the firm had received large credits from the Government, or that a new loan was being negotiated in America.

AT THE INQUEST in connection with the fatal explosion in the proofing room of the Pendleton Works of J. Mandleberg and Co., Ltd. (reported in THE CHEMICAL AGE last week), a verdict of "Accidental Death" was returned on the two workmen who died from injuries received. It was agreed, in evidence, that an electric spark could have caused a fire in such an atmosphere and the process through which the cloth passed might give rise to electrical friction. There was, however, no indication of the cause, and it was stated that the fumes which were constantly rising were carried away by fans. The directors, in expressing their sympathy, desired it to be recorded that they were anxious to act on any advice which modern science could offer to avoid a recurrence of such an explosion. Since the inquest a third death has been reported.

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Patent Literature

Abstracts of Complete Specifications

239,257. Conversion of Lead Sulphate into Lead Carbonate. S. C. Smith, 701, Salisbury House, London, E.C.2. Application date, May 5, 1924.

In the treatment of lead ores, concentrates, or residues, lead sulphate is frequently obtained, and the object of this invention is to convert it into the more useful lead carbonate free from lead sulphate. The lead sulphate is suspended in a solution containing ammonia, and carbon dioxide is passed into it. A strong ammonia solution converts the lead sulphate into substantially pure lead hydroxide if a slight excess is used, but weak ammonia solution requires a greater excess. A temperature of 50°—70° C. is preferable. In an example, lead sulphate is agitated with ammonia and the solids then separated. The liquid is divided into two portions, one of which is used in the treatment of a further quantity of lead sulphate. To the liquor is added (1) a quantity of water equal to that contained in the other portion, (2) a quantity of ammonia slightly greater than that contained in the other portion, (3) a quantity of lead sulphate slightly less than the equivalent of the ammonium sulphate contained in the other portion. The mixture is then agitated as before, and pure hydroxide of lead is obtained. The liquor is again separated, divided, and treated as before. The liquor not used for treating a further quantity of lead sulphate is treated for the recovery of its constituents. The hydroxide of lead is then converted into basic or normal carbonate by treating it in suspension with carbon dioxide. The preferred strength of ammonia solution in this process is 14 per cent.

239,280. Gas, Manufacture of. Humphreys and Glasgow, Ltd., and J. C. Stelfox, 38, Victoria Street, Westminster, London. Application dates, June 4 and November 3, 1924.

This process is of the kind in which coal is carbonised by internal heating, and the resulting coke used for the production of water gas. The coke is subjected to an air blast, and the gases are led, without passing through the coal, through recuperators. The heat stored in the latter is used for superheating steam, which is used for carbonising the coal alternately with hot water-gas produced by steaming the coke. Alternatively, after the recuperators are heated, the air blast is continued and the blast gases passed through the coal thus helping to carbonise it. The resulting gases are stored.

239,304. Fibrous Cellulose, Treatment of—for the Production of Hydrated Derivatives. W. Bacon, 27, Walbrook, London, and I.P.M. Syndicate, Ltd., 15, Grosvenor Mansions, 82, Victoria Street, Westminster, London. Application date, June 14, 1924.

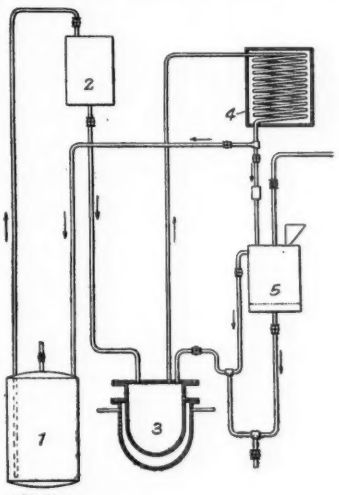
Fibrous cellulose is first hydrated by chemical means, and then washed to remove the excess of alkali and carbon bisulphide, or it may be neutralised with dilute acid. This is followed by a mechanical hydration by a beating in a hollander or beater. Fibres so treated absorb water rapidly, and the beating is continued until the material passes into the gel condition. The beating may be varied according to the extent of hydration desired.

239,320. Alkyl-Ethers of Nitrophenols, Manufacture of. H. G. C. Fairweather, London. From National Aniline and Chemical Co., Inc., 40, Rector Street, Manhattan, New York. Application date, July 15, 1924.

The process is for producing alkyl ethers of nitrophenols from nitrochlor derivatives of benzene, particularly *o*-nitranisol from *o*-nitrochlorbenzene. The object is to minimise the formation of nitrophenol, so that the process may be operated on an industrial scale. A nitrochlor derivative of an aromatic hydrocarbon of the benzene series is heated to boiling in an alcohol, the vessel having a reflux condenser, and the condensed alcohol is caused to pass through caustic alkali in its return to the reaction mixture. The caustic alkali is thus dissolved and introduced into the mixture at a rate controlled by the rate of distillation. The process can be carried out at ordinary or other pressure, and the pressure may be varied to cause the liquid to boil at the desired temperature of the reaction. The proportions and concentrations of the materials may be varied within wide limits. In producing the ethyl ethers, ethyl alcohol denatured by the addition of benzene can be employed.

In an example, *o*-nitrochlor-benzene is dissolved in methyl alcohol of specific gravity 0·825 to 0·830, and the solution heated to boiling. Caustic soda is gradually added over a period of 60—65 hours by refluxing the alcohol as described above, and the boiling continued for a further 40 hours to complete the methylation. The mixture is then cooled, and neutralised by adding concentrated sulphuric acid, which minimises the formation of nitrophenol by the saponification of the *o*-nitranisol by the caustic alkali. The alcohol is then distilled off leaving the *o*-nitranisol.

Alcohol is supplied from a storage tank 1 to a measuring tank 2 and thence to a steam-jacketed reaction vessel 3. The alcohol vapour condenses in a coil 4, and the condensate passes through a vessel 5 containing caustic soda, in its return



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to the vessel 3. At the end of the reaction the alcohol is distilled off, condensed, and returned to the vessel 1. The gradual addition of caustic alkali maintains it in a low concentration in the reaction mixture, and thus minimises the production of by-products such as nitrophenol, dichlorazoxybenzene, etc.

The crude *o*-nitranisol is purified by distilling with steam at 150° C. and employing two condensers. If the first condenser is kept at 105°—110° C., most of the *o*-nitranisol condenses in it, and the steam and impurities pass on to the cooler condenser. Alternatively, the crude *o*-nitranisol can be purified by precipitating the *o*-nitrophenol with caustic soda and filtering.

In a similar manner, orthonitrochlorbenzene is converted into orthonitrophenetol by using ethyl alcohol, and paranitrochlorbenzene can be converted into its alkyl ethers. The corresponding nitrobrom and nitroiodo derivatives may also be employed as initial materials.

239,363. Arsenical Salts, Method of Making. S. J. Lloyd and A. M. Kennedy, Colonial Place University, Alabama, U.S.A. Application date, September 15, 1924.

The process is for oxidising a soluble arsenite to the corresponding arsenate, from which may be obtained the arsenates of calcium and lead, used as insecticides. Arsenic trioxide is dissolved in sodium carbonate or hydroxide solution, preferably the latter, the solution being neutral or slightly basic. The solution is then electrolysed with iron electrodes and is oxidised to the arsenate at the anode with a high efficiency. A small amount of metallic arsenic is produced at the cathode. If a diaphragm cell is employed, with sodium hydroxide in the cathode compartment, reduction to metallic arsenic is prevented, but the efficiency is less than that of the single cell. The arsenates of calcium and lead are obtained from sodium arsenate in the usual manner. Alternatively, insoluble

arsenites may be added to the sodium salt solution in the electrolytic cell, and thereby oxidised.

239,397. SULPHURIC ACID, CHAMBERS USED IN THE MANUFACTURE OF. W. G. Mills, and Packards, and James Fison (Thetford), Ltd., Duke Street, Ipswich. Application date, November 17, 1924.

Chambers employed in the manufacture of sulphuric acid are supported by means of surrounding straps which are burnt to them, the upper edge being passed over a support and burnt to itself. The strap forms a trough for the collection of cooling water which is distributed by means of small openings near the lower edge of the strap.

239,470. DYEING OR COLOURING OF ARTICLES MADE WITH CELLULOSE ACETATE. British Celanese, Ltd., 8, Waterloo Place, London, S.W.1, and G. H. Ellis, of British Celanese, Ltd., Spondon, near Derby. Application date, April 4, 1924.

Cellulose acetate fabrics, films, etc., are dyed or coloured with unsulphonated nitro derivatives of diarylamines other than 2 : 4-dinitro derivatives. These may contain other substituent groups such as hydroxy, amino, or chlor groups, and may contain one, two, or more nitro groups. These derivatives are applied as aqueous solutions or suspensions, and give greenish-yellow to brown shades. Examples of compounds employed include 4-mononitrodiphenylamine, 4-nitrophenyl-4¹-tolylamine, 4-chlor-2-nitrodiphenylamine, 4-nitro-4¹-chlordiphenylamine, 4-chlor-2-nitro-4¹-aminodiphenylamine, 4-chlor-2-nitro-4¹-methoxydiphenylamine, 4-chlor-2-nitro-4¹-hydroxydiphenylamine, 4-chlor-2-nitro 3¹-amino-diphenylamine, 4 : 4¹-dinitrodiphenylamine, 4 : 4¹-dinitro-3¹-hydroxydiphenylamine, 4-nitrophenyl-4¹-nitro-2¹-tolylamine, 2 : 4¹-dinitrodiphenylamine, 4 : 4¹-dichlor-2-nitrodiphenylamine, 4 : 4¹-dinitro-2¹-hydroxydiphenylamine.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention: 218,271-2 (H. Suida), relating to concentration of acetic acid, see Vol. XI, pp. 244-5; 218,277 (C. O. Terwilliger), relating to synthetic resins, see Vol. XI, p. 245; 220,602 (Vereinigte Aluminium-werke Akt.-Ges.), relating to an aluminium-copper-silicon alloy, see Vol. XI, p. 39 (Metallurgical Section); 222,103 (H. O. Chute), relating to vulcanisation of rubber, see Vol. XI, p. 530; 222,876 (X. de Spirlet), relating to burning, reducing, or roasting fuel or ores, see Vol. XI, p. 609; 224,509 and 228,512 (C. G. Schwalbe), relating to utilisation of sulphite cellulose lye, see Vol. XII, pp. 59 and 363; 229,640 (Ges. für Kohlentechnik), relating to production of sodium bicarbonate and sal-ammoniac, see Vol. XII, p. 462; 234,039 (F. Kempter), relating to viscose, see Vol. XIII, p. 71; 234,122 (E. Merck), relating to preparation of phosphoric acid free from arsenic, see Vol. XIII, p. 109.

International Specifications not yet Accepted

237,875. PHOSPHATE FERTILISERS. Rhenania Verein Chemischer Fabriken Akt.-Ges., Mannheim, Germany. International Convention date, August 1, 1924.

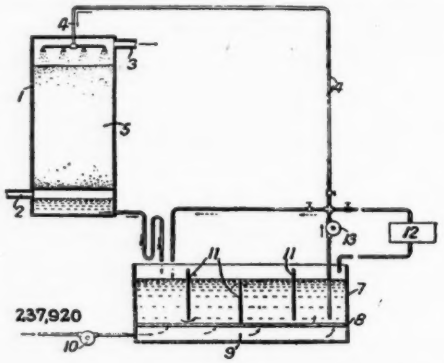
A mixture of natural calcium phosphate, magnesium chloride or sulphate, with or without an alkali salt, and with enough silica to form calcium orthosilicate with the calcium displaced by the magnesium and alkali metal, is heated to 900°-1,100° C. in an atmosphere containing water vapour. The silica may be reduced if iron or aluminium are present to take up the calcium as ferrite or aluminate. If sufficient silica is present in the raw phosphate, no addition may be necessary. The product is a fertiliser containing trimagnesium phosphate, a magnesium-calcium phosphate, or an alkali-magnesium-calcium phosphate.

237,903. ELECTROLYSIS. R. Pechkranz, 24, Rue de Lancy, Geneva, Switzerland. International Convention date, August 2, 1924.

In the electrolytic decomposition of water in apparatus of the filter press type, the joints are packed with insulating material, *e.g.*, asbestos, impregnated with bitumens, etc.

237,920. PURIFYING GASES. Humphreys and Glasgow, Ltd., 38, Victoria Street, Westminster, London. (Assignees of W. H. Fulweiler, Wallingford, Pa., U.S.A.) International Convention date, August 1, 1924.

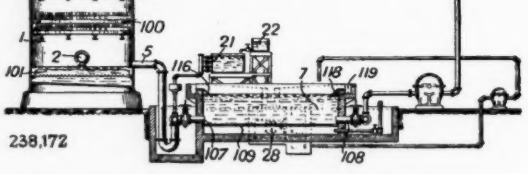
Gas is freed from sulphuretted hydrogen by treating with a salt solution which forms a sulphydrate, and the salt solution is then regenerated by blowing air through it. The gas enters a coke scrubber by a pipe 2, and sodium carbonate solution is supplied by a pipe 4. The solution runs into a tank 7, and



air is supplied by a pump 10 to the space 9 below a porous diaphragm 8. Air passes into the solution in finely divided form, and mixing is effected by baffles 11. The solution is forced by a pump 13 to a filter 12 where precipitated sulphur is recovered.

238,172. PURIFYING FUEL GASES. Koppers Co., 800, Union Arcade Building, Pittsburg, U.S.A. (Assignees of F. W. Sperr and D. L. Jacobson, 800, Union Arcade Building, Pittsburg, U.S.A. International Convention date, August 7, 1924.

Coal gas enters a scrubber 1 at the bottom, and passes up through bubbling hoods 101 immersed in a suspension of a freshly precipitated iron compound in sodium carbonate. The gas then passes upwards through a shower of the same reagent supplied by a pipe 3, and falling over hurdles 100. The impure reagent flows out through a pipe 5 to an aerator 7



having a porous bottom 109 through which air is forced upwards by a pump. Sodium carbonate and ferric sulphate in tanks 21, 22 are caused to react and the precipitated iron sludge is passed through a feed box 116 so as to maintain a 1 per cent. excess of Fe_2O_3 in the system. Skimming plates 118 are provided to receive the sulphur liberated by aeration.

238,205. LEAD CHLORIDE, FROM TIN-LEAD ORES. Consortium für Nassmetallurgie, Oker, Harz, Germany. International Convention date, August 8, 1924.

A tin-lead ore containing 20 per cent. lead and 49 per cent. tin is treated with sodium chloride solution containing hydrochloric acid to remove the lead. The residue may contain 66 per cent. of tin.

238,215. CRYSTALLISING. Soc. des. Condenseurs Delas, 103, Rue St. Lazare, Paris. International Convention date, August 6, 1924.

A solution is mixed with a volatile substance which is then caused to evaporate by reduced pressure, and so effect a cooling which causes crystallisation.

LATEST NOTIFICATIONS

240,401. Process for the production of lead compounds from ores, metallurgical products, waste products from chemical processes, and the like. Consortium für Nassmetallurgie. September 23, 1924.

240,420. Manufacture of sulphocyano-derivatives. Akt.-Ges. für Anilin-Fabrikation. September 24, 1924.

240,424. Process and apparatus for the manufacture of white lead pigments. Kendall, S. W. September 24, 1924.
240,435. Process for the manufacture of alumina and of sulphate of aluminium, and products obtained by said process. Patrouilleau, L. G., and Soc. Anon. Alumine et Dérivés. September 29, 1924.
240,436. Apparatus for the production of synthetic ammonia. Montecatini Soc. Generale per l'Industria Mineraria ed Agricola. September 24, 1924.
240,459. Manufacture of readily soluble vat preparations from quinone vat-dyestuffs for wool. Farbwerke vorm. Meister, Lucius, and Brüning. September 24, 1924.
240,492. Process for the manufacture of wool dyestuffs of the anthraquinone series. Farbenfabriken vorm. F. Bayer and Co. September 26, 1924.

Specifications Accepted with Date of Application

217,900. Tin from tin-containing minerals, alloys, scoria, and scrap, Process for extractin. gSoc. d'Electro-Chimie d'Electro-Metallurgie et des Acieries Electriques d'Ugine. June 21, 1923.
219,649. Catalysts proper for reduction and hydrogenation processes. Soc. Chimiques des Usines du Rhône. July 26, 1923.
222,141. Terpene alcohols, Process for the production of. G. Austerweil. September 19, 1923.
222,463. Phosphatides, Process for the preparation of. G. Schicht Akt.-Ges. (Firm of). September 27, 1923.
222,484. Low temperature distillation of brown coal, peat and the like, Method of. F. Caspari. September 27, 1923.
223,601. Fatty acids and their alkali combinations, Preparation of. R. Vidal. October 19, 1923.
229,272. Alcohol from ethyl sulphuric acid, Manufacture of. Compagnie de Bethune. February 11, 1924.
230,487. Pharmaceutical products, Manufacture of. L. Cassella and Co., Ges. March 10, 1924.
231,827. Inactive menthol. Production of. Rheinische Kampfer-Fabrik Ges. April 4, 1924.
235,521. Ethyl chloride, Process for the manufacture of. Chemische Fabriken vorm. Weiler-ter-Meer. June 12, 1924.
239,895. Tricalcium saccharate, Process for the continuous washing of. C. Steffen, jun. April 15, 1924.
239,933. Dyestuffs containing sulphur, Manufacture of. O. Y. Imray. (*Soc. of Chemical Industry in Basle.*) June 18, 1924.
239,934. Ammonia and ammonium compounds from gases, Process for recovering. P. von der Forst. June 18, 1924.
239,951. Arseno compounds, Production of. A. J. Ransford and A. Carpmael. (*L. Cassella and Co., Ges.*) June 27, 1924.
239,981. Dyeing artificial silk. Burgess, Ledward and Co., Ltd., F. Scholefield and N. Denner. August 1, 1924.
239,985. Therapeutic compounds, Manufacture of. Wellcome Foundation, Ltd., W. H. Gray and T. A. Henry. August 12, 1924.
239,989. Coal and other carbonaceous matter, Means for the treatment of—for obtaining products therefrom. P. Dvorkovitz. August 18, 1924. Addition to 192,816.
240,003. Tanning substances, Manufacture of. Farbwerke vorm. Meister, Lucius, und Brüning, G. Kranzlein, and A. Voss. September 23, 1924. Addition to 211,145.
240,051. Quinoline-4-aldehyde and its 2-position aryl derivatives, Manufacture of. W. Carpmael. (*Chemische Fabrik auf Actien (vorm. E. Schering).*) January 13, 1925.
240,068. Iron alloys, Manufacture of. C. H. Thompson and N. Martin. March 6, 1925.
240,087. Formamide, Manufacture of. J. Y. Johnson. (*Badische Anilin und Soda Fabrik.*) May 1, 1925.

Applications for Patents

Badische Anilin and Soda Fabrik and Johnson, J. Y. Removal of iron from materials containing same. 24,667. October 3.
Beckett, E. G., Drescher, H. A. E., Scottish Dyes, Ltd., Thomas, J., and Woodcock, W. G. Dyestuffs. 24,699. October 3.
Bentley, W. H., and Blyth and Co., Ltd. Manufacture of poly-nitro-amines. 24,552. October 2.
Blicquy, J. de, and Callebaut, C. Dyeing-machines. 24,580. October 2.
Böniger, M., and Sandoy Chemical Works. Manufacture of diazotizable azo-dyestuffs, etc. 24,148. September 28.
Chemische Fabrik Griesheim-Elektron. Production of aluminium chloride and alumina. 24,276. September 29. (Germany, October 2, 1924.)
Chemische Fabrik Griesheim-Elektron. Production of iron-free alumina. 24,399. September 30. (Germany, October 13, 1924.)
Commonwealth White Lead and Paints Proprietary, Ltd. Manufacture of lead compounds. 24,309. September 29. (Australia, March 30.)
Farbenfabriken vorm. F. Bayer and Co. Manufacture of wool dyestuffs. 24,165. September 28. (Germany, September 27, 1924.)
Farbwerke vorm. Meister, Lucius, and Brüning. Manufacture of finely-subdivided pigment dyes. 24,527. October 1. (Germany, October 1, 1924.)
Farbwerke vorm. Meister, Lucius, and Brüning. Manufacture of 1 : 4 : 5 : 8 naphthalene-tetracarboxylic acid, etc. 24,623. October 2, (Germany, October 2, 1924.)
Grasselli Chemical Co. and Marks, E. C. R. Sulphur burners. 24,290. September 29.
Haynes, P. E. Manufacture of carbon dioxide. 24,686. October 3.
Long, C. L., Wheeler, T. S., and Willson, F. G. Manufacture of halogenohydrins. 24,618. October 2.
Pollak, F. Treatment of condensation products of carbamide, etc., with aldehydes. 24,366. September 30. (Austria, October 1, 1924.)
Ridley, F. T. Treatment of cellulose derivatives, etc. 24,142. September 28.
Riley, F. Dyeing, etc., machines. 24,085. September 28.
Sutcliffe, E. R. Distillation of carbonaceous substances. 24,183. September 28.
Sutcliffe, E. R. Apparatus for distillation of coal, etc. 24,415. September 30.
Sutcliffe, E. R. Treatment of coal, etc. 24,416. September 30.

A Non-Corrosive Cement

Investigation of Manganese Oxychloride Product

THE Building Research Board, set up by the Department of Scientific and Industrial Research, has been investigating the question of the corrosive action on metal of ordinary cement, and it has now published a report on Jointless (magnesium oxychloride) Floors, by Mr. P. W. Barnett and Mr. B. Bakewell (H.M. Stationery Office, 1s. net). The purpose was to find a magnesium chloride cement that did not corrode iron work. It is believed that this result has been obtained and the invention has been patented.

The new cement is believed for all practical purposes to be non-corrosive of iron and other metal work. It shows less expansion on setting, and stands the action of water better. This, however, is subject to its having been made with well calcined, properly ground, and sufficiently pure magnesia, and even then it cannot be claimed to be absolutely waterproof.

Research suggested that with the ordinary material the iron combined with the chloride in the cement, and accordingly it was thought that if magnesium chloride were replaced by the chloride of a metal having at least as strong an affinity for chloride as has iron, the corrosion might be counteracted.

Ferrous chloride was chosen for cheapness and, added in solution to the magnesia, it was found that enough could not be employed, and it was therefore mixed with the magnesia, and water then added. With an insufficient amount of ferrous chloride the cement was only half as strong as the magnesium chloride cement, and corroded iron filings readily. As, however, the amount of ferrous chloride was increased, it was noticed that a few small patches of blue occurred in the microscope slide, and that in these the iron remained perfectly bright. It had, in fact, remained bright in the first of these slides for more than two years since it was made. By increasing the amount of ferrous chloride a point was reached when the whole slide, except a thin margin, remained blue. The margin itself was oxidised to a brown colour, but the blue ferrous compound within was found to be perfectly stable after it had once hardened, and was without any corrosive effect on iron. The setting time of the neat cement was from 3 to 12 hours, according to conditions of temperature and moisture.

The nature of the filler was restricted to some extent by the fact that an excess of water tended to decrease the strength of the cement and to cause the brown corrosive compound to appear. Waterproofed sawdust would have overcome the difficulty, though adding some complication and cost to the process; but, for the most part, granulated cork gave satisfactory results, and very little more water was required with this filler than with neat cement.

Slight action appeared exceptionally on iron and tinplate where sand was added, but apparently not otherwise. Lead, zinc, and aluminium were entirely unaffected. It was thought that the flooring would cost no more than the present material. The non-corrosive cement seems to withstand water to a greater extent than ordinary magnesium oxychloride cement. It has the disadvantage that the blue mixture turns brown on exposure to air, and therefore does not lend itself so easily to the addition of colouring pigments.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.*

London, October 7, 1925.

THERE is very little change in the general position. Trade, if anything, is slightly better than of late. Prices on the whole continue steady, with a firm undercurrent.

The export market has been fairly satisfactory, but orders in the main are for small quantities only.

General Chemicals

ACETONE.—This remains in steady demand. Stocks are light, and price is firm at from £75 to £76 per ton.

ACID ACETIC.—Only a fair demand. Technical is quoted at £37 to £39 per ton for 80%, and pure at £38 10s. to £40 10s. per ton, according to quantity and position.

ACID FORMIC has been fairly active, and 85% is now quoted at £46 per ton, ex wharf.

ACID LACTIC has been in better demand, and is quoted at £43 per ton for 50% by weight.

ACID OXALIC continues quiet, but price seems steadier at to-day's quotation of 3¾d. per lb.

ALUMINA SULPHATE.—Competition continues keen, but a certain amount of business has been placed at round about the basis of £6 2s. 6d. per ton.

AMMONIUM CHLORIDE is only fair, and price is without change.

ARSENIC.—This market continues almost nominal, and within limits buyers can name their own price for fair quantities.

BARIUM CHLORIDE seems to be somewhat easier, and for the small business passing £8 15s. per ton would represent a fair quotation.

EPSOM SALTS continues firm, and the market stands at from £5 to £5 5s. per ton.

FORMALDEHYDE.—The firmer tendency recently noted is maintained, and price is now strong at £42 per ton.

LEAD ACETATE continues in good demand, and price is firm at £45 10s. to £46 per ton for white, and £46 10s. per ton for brown. The recent difficulties in regard to imports do not appear to have been yet removed.

LIME ACETATE is still idle, and the nominal price is about £15 per ton, basis 80%, for grey.

LITHOPONE continues quietly steady, and is without change at about £20 per ton.

POTASSIUM, CAUSTIC AND CARBONATE.—Unchanged.

POTASSIUM CHLORATE continues in short supply, and is quoted at 4¼d. per lb.

POTASSIUM PERMANGANATE has been very weak and in quiet demand. Supplies can be readily obtained at 7¾d. per lb.

POTASSIUM PRUSSIATE is firm, and is quoted at 7½d. per lb., at which figure there is a good demand.

SODIUM ACETATE is still slow, and price easy at £17 10s. per ton.

SODIUM BICHROMATE.—Import business is reported at the current quotation of 4d. per lb.

SODIUM PRUSSIATE continues firm, and business is reported at 4⅜d. per lb., with a harder tendency.

SODIUM NITRATE is only a poor market, and the material is quoted at £22 10s. per ton.

SODIUM SULPHIDE is very weak, and price stands in buyers' favour.

ZINC SULPHATE.—Unchanged.

Coal Tar Products

There is a slight change to report in the market for Coal Tar Products since last week.

90% BENZOL is weaker, and is quoted at 1s. 8d. per gallon, on rails.

PURE BENZOL is steady at 1s. 11d. to 2s. per gallon, on rails.

CREOSOTE OIL as firm at 6d. per gallon, on rails in the North; while the price in the South is 7d. to 7¼d. per gallon.

CRESYLIC ACID is slightly stronger at 1s. 6½d. per gallon on rails for the pale quality 97/99%, but the dark quality 95/97% can still be obtained at 1s. 1d. per gallon.

SOLVENT NAPHTHA is steady at 1s. 4½d. per gallon, on rails.

HEAVY NAPHTHA is very quiet, and can be bought at 1s. 1d. per gallon.

NAPHTHALENES.—There is slightly more activity in this market. Most of the lower grade has been disposed of in this country to the end of the year at prices ruling round about £3 10s. per ton for small quantities for the home trade. Business is being done in 76/78% quality at about £5 5s. per ton.

PITCH is in somewhat better demand, and prices are slightly firmer. To-day's values are 40s. to 42s. 6d. per ton, f.o.b. main U.K. ports.

Latest Oil Prices

LONDON.—LINSEED OIL, steady, but quiet. Spot, £40 5s.; October to April, £39 2s. 6d. RAPE OIL quiet. Crude, crushed, spot, £49; technical, refined, £52. COTTON OIL, quiet. Refined, common, edible, £47; Egyptian, crude, £41; deodorised, £49. TURPENTINE steady. American, spot, 78s. 3d.; November-December, 79s.; and January-April, 81s. per cwt.

HULL.—LINSEED, spot, £39 5s.; October to January-April, £39 2s. 6d. COTTON OIL, Bombay, crude, £38; Egyptian, crude (new), £42; ditto (old), £40; edible, refined, £44; technical, refined, £42. PALM KERNEL OIL, crushed, naked, 5½ per cent., £43. GROUNDNUT OIL, crushed/extracted, £48; deodorised, £52. SOYA OIL, extracted and crushed, £42; deodorised, £45 10s. RAPE OIL, extracted, £47 10s. per ton, net cash terms, ex mill. CASTOR OIL and COD OIL unchanged.

Nitrogen Products Market

Export.—During the last week the market has remained firm and sales have been made on the basis of £12 per ton, in single bags, f.o.b. U.K. port.

Home.—The home demand remains quiet, as is usual at this time of the year, for spot orders. The October price of £12 9s. per ton for neutral quality, basis 21·1 per cent. nitrogen, delivered in 4-ton lots, is now in force.

Nitrate of Soda.—The tone of the market is distinctly firmer with an appreciable increase of business on the Continent for spring consumption. The prompt value is about £11 6s. 6d. to £11 10s. per ton, c.i.f. European ports, and for November, £11 12s. 6d. per ton. The total sales for shipment after June 1, 1925, amount to about 1,573,000 tons.

American Market Movements

(From *Drug and Chemical Markets.*)

HEAVY chemical prices generally firmer. Copper sulphate higher. Formic acid steady. Barium salts unchanged. Prussiates strong. Ammonium chloride prices steady. Ortho-toluidine sharply lower in resale quarters owing to substitution of sodium xanthate in flotation process. Ortho-nitro-toluidine unsettled. Para-toluidine and para-nitro-toluidine rumoured cut. Pyridine lower. Benzene easier. Commercial xylene sold at premium prices.

Activity in fine chemicals continues to show improvement, but prices have not reflected the enhanced activity. Benzoic acid and sodium benzoate are in a much firmer position.

Chemicals for Water Testing

A BOOKLET describing and illustrating their methods, apparatus, and reagents for water testing has been published by Sofnol, Ltd., chemical manufacturers, Westcombe Hill, Greenwich, S.E.10. It gives the results of actual tests and describes new products used since the first booklet was published. The actual colours given by specific indicators are reproduced, and the chemicals sold by the company are described. It is a book that should be of particular use to engineers and chemists engaged in water analysis, and Sofnol, Ltd., will be pleased to forward a copy free of charge to readers who mention THE CHEMICAL AGE.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

Acid Acetic, 40% Tech.—£20 per ton.

Acid Boric, Commercial.—Crystal, £40 per ton, Powder, £42 per ton.

Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.

Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.

Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.

Bleaching Powder.—Spot, £10 10s. d/d; Contract, £9 10s. d/d, 4 ton lots.

Bisulphite of Lime.—£7 10s. per ton, packages extra, returnable.

Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

Calcium Chlorate (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.

Copper Sulphate.—£25 to £25 10s. per ton.

Methylated Spirit 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

Nickel Sulphate.—£38 per ton d/d.

Nickel Ammonia Sulphate.—£38 per ton d/d.

Potash Caustic.—£30 to £33 per ton.

Potassium Bichromate.—5d. per lb.

Potassium Chlorate.—3¾d. per lb., ex wharf, London, in cwt. kegs.

Salammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.

Salt Cake.—£3 15s. to £4 per ton d/d. In bulk.

Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength; 20s. less for contracts.

Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.

Sodium Acetate 97/98%.—£21 per ton.

Sodium Bicarbonate.—£10 10s. per ton, carr. paid.

Sodium Bichromate.—4d. per lb.

Sodium Bisulphite Powder 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.

Sodium Chlorate.—3d. per lb.

Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool.

Sodium Nitrite 100% basis.—£27 per ton d/d.

Sodium Phosphate, £14 per ton, f.o.r. London, casks free.

Sodium Sulphate (Glauber Salts).—£3 12s. 6d. per ton.

Sodium Sulphide conc. solid. 60/65.—£13 5s. per ton d/d. Contract, £13. Carr. pd.

Sodium Sulphide Crystals.—Spot, £8 12s. 6d. per ton d/d. Contract, £8 10s. Carr. pd.

Sodium Sulphite, Pea Crystals.—£14 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—4¾d. per lb. Crude 60's, 1s. 3d. to 1s. 4d. Rather more inquiry.

Acid Cresylic 97/99.—1s. 5½d. to 1s. 6d. per gall. Steady, with more inquiry. Pale, 95%, 1s. 5d. per gall. Dark, 1s. 3d. to 1s. 6d. per gall.

Anthracene Paste 40%.—3d. per unit per cwt.—Nominal price. No business.

Anthracene Oil, Strained.—8d. to 8½d. per gall. Good inquiry. Unstrained, 7d. to 7½d. per gall.

Benzol.—Crude 65's.—11d. to 1s. 3d. per gall., ex works in tank wagons. Standard Motor, 1s. 8d. to 1s. 10d. per gall., ex works in tank wagons. Pure, 1s. 11d. to 2s. 3d. per gall., ex works in tank wagons. Firm.

Toluol.—90%, 1s. 9d. per gall. More inquiry. Pure, 1s. 11d. to 2s. 2d. per gall.

Xylol Commercial.—1s. 11d. per gall. Pure, 2s. 1d. per gall.

Creosote.—Cresylic, 20/24%, 8d. per gall. Market very quiet. Standard specification, 6¾d. to 6¾d. per gall.; middle oil, heavy, 5¾d. to 6d. per gall. Market steady.

Naphtha.—Solvent 90/160, 1s. 4d. to 1s. 6d. per gall. Fair business. Solvent 90/190, 1s. to 1s. 1d. per gall. Good demand.

Naphthalene Crude.—Drained Creosote Salts, £3 15s. to £5 per ton. Whizzed or hot pressed, £4. Better inquiry.

Naphthalene.—Crystals and Flaked, £12 to £13 per ton, according to districts.

Pitch.—Medium soft, 39s. to 42s. per ton, according to district. More inquiry. Market more active.

Pyridine.—90/160, 17s. 6d. to 19s. 9d. per gall. Weaker. Heavy, 11s. to 11s. 6d. per gall. Market quiet.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.

Acid Amidonaphthol disulpho (1-8-2-4).—10s. 9d. per lb.

Acid Anthranilic.—7s. per lb. 100%.

Acid Benzoic.—1s. 9d. per lb.

Acid Gamma.—9s. per lb.

Acid H.—3s. 6d. per lb. 100% basis d/d.

Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.

Acid Neville and Winther.—4s. 10d. per lb. 100% basis d/d.

Acid Sulphanilic.—9d. per lb. 100% basis d/d.

Aluminium Chloride, anhydrous.—10d. per lb. d/d.

Aniline Oil.—7d. per lb. naked at works.

Aniline Salts.—7d. per lb. naked at works.

Antimony Pentachloride.—1s. per lb. d/d.

Benzaldehyde.—2s. 1½d. per lb. Good home inquiry.

Benzidine Base.—3s. 6d. per lb. 100% basis d/d.

Benzyl Chloride 95%.—1s. 1d. per lb.

p-Chlorphenol.—4s. 3d. per lb. d/d.

p-Chloraniline.—3s. per lb. 100% basis.

o-Cresol 29/31° C.—3d. per lb. Demand quiet.

m-Cresol 98/100%.—2s. 1d. per lb. Demand moderate.

p-Cresol 32/34° C.—2s. 1d. per lb. Demand moderate.

Dichloraniline.—2s. 3d. per lb.

Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.

Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.

Dimethylaniline.—2s. per lb. d/d. Drums extra.

Dinitrobenzene.—9d. per lb. naked at works.

Dinitrochlorbenzene.—£84 10s. per ton d/d.

Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. per lb. naked at works.

Diphenylaniline.—2s. 10d. per lb. d/d.

G. Salt.—2s. 2d. per lb. 100% basis d/d.

a-Naphthol.—1s. 10d. per lb. d/d. Fair home inquiry.

B-Naphthol.—1s. per lb. d/d. Fair home inquiry.

a-Naphthylamine.—1s. 3d. per lb. d/d. Fair home inquiry.

B-Naphthylamine.—3s. 9d. per lb. d/d. Fair home inquiry.

m-Nitraniline.—3s. 9d. per lb. d/d.

p-Nitraniline.—1s. 11d. per lb. d/d. Fair home inquiry.

Nitrobenzene.—5d. per lb. naked at works. Good home inquiry.

o-Nitrochlorbenzol.—2s. 3d. per lb. 100% basis d/d.

Nitronaphthalene.—10d. per lb. d/d.

p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.

p-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.

m-Phenylene Diamine.—4s. per lb. d/d.

p-Phenylene Diamine.—9s. 9d. per lb. 100% basis d/d.

R. Salt.—2s. 4d. per lb. 100% basis d/d.

Sodium Naphthionate.—1s. 8d. per lb. 100% basis d/d.

o-Toluidine.—8d. per lb. Good home inquiry.

p-Toluidine.—2s. 3d. per lb. naked at works.

m-Toluylene Diamine.—4s. per lb. d/d.

Wood Distillation Products

Acetate of Lime.—Brown £8. Quiet market. Grey, £14 10s. per ton. Liquor, 9d. per gall. 32° Tw.

Acetone.—£73 per ton.

Charcoal.—£7 to £9 per ton, according to grade and locality. Demand fair.

Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall, 24° Tw.

Red Liquor.—10d. to 1s. per gall. 15° Tw.

Wood Creosote.—2s. 7d. per gall. Unrefined.

Wood Naphtha, Miscible.—5s. per gall. 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P. Very quiet.

Wood Tar.—£3 15s. to £5 per ton, according to grade.

Brown Sugar of Lead.—£40 per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 7½d. to 1s. 5d. per lb., according to quality, Crimson, 1s. 5d. to 1s. 7½d. per lb., according to quality.

Arsenic Sulphide, Yellow.—2s. per lb.

Barytes.—£3 10s. to £6 15s. per ton, according to quality.

Cadmium Sulphide.—4s. 4d. per lb.

Carbon Bisulphide.—£25 to £28 per ton, according to quantity.

Carbon Black.—5½d. per lb., ex wharf.

Carbon Tetrachloride.—£55 to £60 per ton, according to quantity, drums extra.

Chromium Oxide, Green.—1s. 3d. per lb.

Diphenylguanidine, 4s. to 4s. 3d. per lb.

Indiarubber Substitutes, White and Dark.—5¾d. to 6¾d. per lb.

Lamp Black.—£43 per ton, barrels free.

Lead Hyposulphite.—9d. per lb.

Lithopone, 30%.—£22 10s. per ton.

Mineral Rubber "Rubpron."—£13 12s. 6d. per ton f.o.r. London.

Sulphur.—£9 to £11 per ton, according to quality.

Sulphur Chloride.—4d. per lb., carboys extra.
Sulphur Precip. B.P.—£50 to £55 per ton.
Thiocarbamide.—2s. 6d. to 2s. 9d. per lb.
Thiocarbanilide.—2s. 1d. to 2s. 3d. per lb.
Vermilion, Pale or Deep.—5s. per lb.
Zinc Sulphide.—1s. 1d. per lb.

Pharmaceutical and Photographic Chemicals

Acid, Acetic, 80 % B.P.—£39 per ton ex wharf London in glass containers.
Acid, Acetyl Salicylic.—2s. 6½d. to 2s. 8d. per lb. Keen competition continuing. Good demand.
Acid, Benzoic B.P.—2s. to 2s. 3d. per lb., according to quantity.
Acid, Boric B.P.—Crystal £46 per ton, Powder £50 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 4d. per lb., less 5%. Unsettled.
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in cwt. lots.
Acid, Pyrogallic, Crystals.—5s. 4d. to 5s. 6d. per lb.
Acid, Salicylic.—1s. 4d. to 1s. 6d. per lb. Technical.—10½d. to 11d. per lb.
Acid, Tannic B.P.—2s. 8d. per lb.
Acid, Tartaric.—1s. 0½d. per lb., less 5%. Market firm.
Amidol.—6s. 6d. per lb., d/d.
Acetanilide.—1s. 5d. per lb. for quantities.
Amidopyrin.—12s. 9d. per lb.
Ammonium Benzoate.—3s. 3d. to 3s. 6d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.
Atropine Sulphate.—11s. 6d. per oz. for English make.
Barbitone.—10s. 3d. to 10s. 6d. per lb.
Benzonaphthol.—3s. 3d. per lb. spot.
Bismuth Carbonate.—12s. 9d. to 14s. 9d. per lb.
Bismuth Citrate.—11s. 4d. to 13s. 4d. per lb.
Bismuth Salicylate.—10s. 2d. to 12s. 2d. per lb.
Bismuth Subnitrate.—10s. 9d. to 12s. 9d. per lb. according to quantity.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 10d. to 2s. per lb.; sodium, 2s. 1d. to 2s. 3d. per lb.; ammonium, 2s. 5d. to 2s. 7d. per lb., all spot. British or Imported. Firm.
Calcium Lactate.—1s. 4d. to 1s. 6d. B.P. 2s. 8d. to 3s., according to quantity.
Chloral Hydrate.—3s. 5d. to 3s. 6d. per lb., duty paid.
Chloroform.—2s. 5½d. to 2s. 7½d. per lb., according to quantity.
Creosote Carbonate.—6s. 9d. per lb.
Formaldehyde.—£41 per ton, in barrels ex wharf.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 60%, 2s. 6d. per lb.
Guaiacol Carbonate.—6s. to 7s. per lb.
Hexamine.—2s. 5d. per lb.
Homatropine Hydrobromide.—30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydrogen Peroxide (12 vols.).—1s. 8d. per gallon f.o.r. makers' works, naked.
Hydroquinone.—4s. 4½d. per lb., in cwt. lots.
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—1s. 8d. to 1s. 11d. per lb. Green, 2s. 2d. to 2s. 7d. per lb. U.S.P., 1s. 7d. to 1s. 10d. per lb.
Magnesium Carbonate.—Light Commercial, £34 per ton net. Light pure, £46 per ton.
Magnesium Oxide.—Light Commercial, £70 per ton, less 2½%, price reduced; Heavy Commercial, reduced to £24 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.
Menthol.—A.B.R. recrystallised B.P., 46s. net per lb., October delivery. Synthetic, 22s. 6d. to 27s. 6d. per lb., according to quality. English make.
Mercurials.—Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 7d. to 3s. 9d. per lb; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb. Still quiet.
Methyl Salicylate.—1s. 8d. per lb. Demand increasing, price firmer.
Methyl Sulphonal.—17s. 6d. per lb.
Metol.—9s. per lb. British make.
Paraformaldehyde.—1s. 7d. for B.P. quality.
Paraldehyde.—1s. 4½d. per lb., in free bottles and cases.
Phenacetin.—4s. to 4s. 3d. per lb.
Phenazone.—6s. to 6s. 3d. per lb. Spot lower than forward price.
Phenolphthalein.—4s. to 4s. 3d. per lb. Supply exceeds demand.
Potassium Bitartrate 99/100% (Cream of Tartar).—80s. per cwt., less 2½% for ton lots. Market very firm.
Potassium Citrate.—1s. 7d. to 1s. 9d. per lb.
Potassium Ferricyanide.—1s. 8d. to 1s. 9d. per lb. Quiet.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity Steady market.
Potassium Metabisulphite.—6d. to 7½d. per lb., 1-cwt. kegs included, f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., spot. Firmer.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.
Resorcin.—3s. 10½d. per lb. In fair quantities.
Saccharin.—63s. per lb. in 50 lb. lots.
Salol.—3s. 3d. to 3s. 6d. per lb.
Silver Proteinate.—12s. per lb. for satisfactory product light in colour.
Sodium Benzoate, B.P.—1s. 10d. to 2s. 2d. per lb.
Sodium Citrate, B.P.C., 1911.—1s. 4d. to 1s. 7d. per lb., B.P.C., 1923. 1s. 7d. to 1s. 10d. per lb., according to quantity.
Sodium Hyposulphite, Photographic.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb.
Sodium Potassium Tartrate (Rochelle Salt).—75s. to 80s. per cwt., according to quantity.
Sodium Salicylate.—Powder, 1s. 11d. to 2s. 1d. per lb. Crystal, 2s. to 2s. 1d. per lb. Flake, 2s. 2d. per lb.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.
Sodium Sulphite, anhydrous, £27 10s. to £28 10s. per ton, according to quantity; 1-cwt. kegs included.
Sulphonal.—12s. per lb. Limited demand.
Thymol.—13s. to 15s. per lb.

Perfumery Chemicals

Acetophenone.—9s. per lb.
Aubepine (ex Anethol).—11s. per lb.
Amyl Acetate.—3s. per lb.
Amyl Butyrate.—6s. 6d. per lb.
Amyl Salicylate.—3s. 1½d. per lb.
Anethol (M.P. 21/22° C.).—6s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 4d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 4d. per lb.
Benzaldehyde free from Chlorine.—2s. 9d. per lb.
Benzyl Benzoate.—2s. 9d. per lb.
Cinnamic Aldehyde Natural.—15s. 6d. per lb.
Coumarin.—13s. per lb.
Citronellol.—19s. per lb.
Citral.—10s. per lb.
Ethyl Cinnamate.—9s. per lb.
Ethyl Phthalate.—3s. per lb.
Eugenol.—9s. 6d. per lb.
Geraniol (Palmarosa).—25s. per lb.
Geraniol.—8s. to 16s. per lb.
Heliotropine.—6s. 3d. per lb.
Iso Eugenol.—14s. 6d. per lb.
Linalol ex Bois de Rose.—22s. per lb.
Linalyl Acetate.—20s. per lb.
Methyl Anthranilate.—9s. 3d. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ketone.—30s. per lb.
Musk Xylol.—7s. per lb.
Nerolin.—4s. per lb.
Phenyl Ethyl Acetate.—14s. per lb.
Phenyl Ethyl Alcohol.—12s. per lb.
Rhodinol.—36s. 6d. per lb.
Safrol.—1s. 8d. per lb.
Terpineol.—1s. 8d. per lb.
Vanillin.—23s. 9d. per lb.

Essential Oils

Almond Oil.—12s. 6d. per lb.
Anise Oil.—3s. 6d. per lb.
Bergamot Oil.—27s. 6d. per lb.
Bourbon Geranium Oil.—16s. per lb.
Camphor Oil.—60s. per cwt.
Cananga Oil, Java.—11s. 3d. per lb.
Cinnamon Oil, Leaf.—5d. per oz.
Cassia Oil, 80/85%.—10s. 3d. per lb.
Citronella Oil.—Java, 85/90%, 3s. 7d.; Ceylon, 2s. 3d. per lb.
Clove Oil.—7s. 6d. per lb.
Eucalyptus Oil, 70/75%.—1s. 10d. per lb.
Lavender Oil.—French 38/40% Esters, 32s. per lb.
Lemon Oil.—6s. 9d. per lb. 7s. asked for forward shipment.
Lemongrass Oil.—4s. 9d. per lb.
Orange Oil, Sweet.—10s. 9d. per lb.
Otto of Rose Oil.—Bulgarian, 60s. per oz. Anatolian, 35s. per oz.
Palma Rosa Oil.—13s. 9d. per lb.
Palma Rose Oil.—15s. 3d. per lb.
Peppermint Oil.—Wayne County. 70s. for shipment from U.S.A. Japanese, 28s. per lb. Much firmer.
Petitgrain Oil.—9d. per lb.
Sandal Wood Oil.—Mysore, 26s. per lb. Australian, 18s. 6d. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

GLASGOW, *October* 9, 1925.

DURING the past week business in the Heavy Chemical Market has been fairly satisfactory, their being good inquiry both for home and export. Prices, with very few exceptions, remain unchanged.

Industrial Chemicals

ACID ACETIC.—In usual steady demand. 98/100%, quoted £55 to £67 per ton according to quality and packing, c.i.f. U.K. ports. 80% pure, £40/42 per ton. 80% technical, £38 to £40 per ton packed in casks, c.i.f. U.K. ports.

ACID BORIC.—Crystal, granulated, or small flaked, £40 per ton; powdered, £42 per ton, packed in bags, carriage paid U.K. stations.

ACID CARBOLIC, ICE CRYSTALS.—In moderate demand and price unchanged at about 4¾d. per lb. delivered or f.o.b. U:K. ports.

ACID CITRIC, B.P. CRYSTALS.—In little demand. Spot lots quoted 1s. 3d. per lb., less 5% ex store. Offered for early shipment from the continent at a fraction less.

ACID FORMIC, 85%.—Quoted £46 per ton, ex wharf,. Prompt shipment from the continent.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—Remains unchanged at £23 5s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Quoted 3½d. per lb., ex wharf, early delivery. Offered from the continent at a fraction less.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Rather better inquiry. Now quoted 11¾d. per lb., less 5% ex store. Offered for prompt shipment from the continent at 11½d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE, 17/18 %, IRON FREE.—Quoted £6 15s. per ton, ex store, spot delivery. Offered for prompt shipment from the continent at £6 5s. per ton, c.i.f. U.K. ports.

ALUM, LUMP POTASH.—Spot material unchanged at £9 5s. per ton, ex store. Offered for early shipment from the continent at about £8 per ton, c.i.f. U.K. ports.

AMMONIA ANHYDROUS.—In moderate demand and price unchanged at 1s. 4½d. per lb., less 5% ex station. Containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton. Packed in 5 cwt. casks, delivered U.K. ports.

AMMONIA LIQUID, 880°.—In usual steady demand and price unchanged at 2½d. to 3d. per lb., delivered according to quantity.

AMMONIA MURIATE.—Grey galvanisers crystals quoted £28 per ton, ex station for English material. Offered from the continent at about £23 10s. per ton, c.i.f. U.K. ports. Fine white crystals offered from the continent at £19 5s. per ton, c.i.f. U.K. ports.

ARSENIC, REFINED WHITE CORNISH.—Now quoted £20 per ton, ex wharf, early delivery. Spot material available at about £23 per ton, ex store.

BARIUM CHLORIDE.—Large crystals quoted £9 10s. per ton, ex store. On offer at £8 5s. per ton, c.i.f. U.K. ports to come forward. Fine white crystals quoted £7 5s. per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—Spot lots English material, £10 10s. per ton, ex station. Contracts 20s. per ton less. On offer from the continent at about £8 7s. 6d. per ton, c.i.f. U.K. ports.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton. Carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English manufacturer's prices unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, carriage paid U.K. stations. Continental on offer at about £3 17s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—In good demand for export. Prices unchanged at about £3 7s. 6d. per ton, f.o.b. U.K. ports, packed in casks.

COPPER SULPHATE.—Spot material available at about £23 10s. per ton, ex wharf. English for export quoted £24 10s. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Spot material quoted £40 per ton, ex store. Rather higher quotations from the continent. Now quoted £39 15s. per ton, c.i.f. U.K. ports.

GLAUBER SALTS.—English material unchanged at £4 per ton, ex store or station. Continental quoted £2 17s. 6d. per ton, c.i.f. U.K. ports.

LEAD, RED.—Imported material quoted £45 per ton, ex store On offer from the continent at about £43 5s. per ton, c.i.f. U.K. ports.

LEAD, WHITE.—Unchanged at about £45 per ton, ex store, spot delivery.

LEAD ACETATE.—White crystals. Spot material, quoted £45 per ton, ex store. Brown, about £43 per ton, ex store. White crystals on offer from the continent at £43 15s. per ton, c.i.f. U.K. ports. Brown, about £38 10s. per ton, c.i.f. U.K. ports.

MAGNESITE, GROUND CALCINED.—In moderate demand, and price unchanged at about £8 15s. per ton, ex station.

POTASH CAUSTIC, 88/92%.—Syndicate prices unchanged at £27 10s. per ton, c.i.f. U.K. ports. Spot material available at about £29 10s. per ton, ex store.

POTASSIUM BICHROMATE.—Prices for home consumption, 5d. per lb. delivered.

POTASSIUM CARBONATE, 96/98%.—Rather cheaper quotations from the continent. Now quoted £25 15s. per ton, c.i.f. U.K. ports. Spot material available at about £26 10s. per ton, ex store.

POTASSIUM CHLORATE, 98/100%.—Now quoted about £30 10s. per ton, c.i.f. U.K. ports. Only small quantities available for immediate delivery.

POTASSIUM NITRATE, SALTPETRE.—99% refined granulated, quoted £24 15s. per ton, c.i.f. U.K. ports. Spot material available at about £27 5s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Spot material quoted 8d. per lb., ex store. Offered for early delivery at 7¾d. per lb., ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—Good inquiry and price unchanged at about 7½d. per lb., ex store. Offered for early shipment from the continent at about 7¼d. per lb., ex wharf.

SODA CAUSTIC.—76/77%, £18 per ton; 70/72%, £16 12s. 6d. per ton; broken, 60%, £17 2s. 6d. per ton; powdered, 98/99%, £21 7s. 6d. per ton. All carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Spot material unchanged at about £18 15s. per ton, ex store. Quoted £18 per ton, c.i.f. U.K. ports, prompt shipment from the continent.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM CARBONATE, SODA CRYSTALS.—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality, £1 7s. 6d. per ton more. Alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture unchanged at £9 10s. per ton, ex station, minimum ton lots. Fine crystals, commercial quality, quoted £8 10s. per ton, ex station. Pea crystals, £14 per ton, ex station. Continental commercial quality, quoted £9 5s. per ton, ex store.

SODIUM NITRATE.—Quoted £13 per ton, ex store; 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Quoted £24 per ton, ex store. Offered from the continent about £22 5s. per ton, c.i.f. U.K. ports.

SODIUM PRUSSIATE, YELLOW.—Spot lots quoted at 4d. per lb., ex store. Continental material quoted ex wharf at about the same figure.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton, f.o.r. works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—English material. Solid, 60/62%, now £13 per ton. Broken, £14 per ton. Flake, £15 per ton. Crystals, £8 10s. per ton. Carriage paid U.K. stations, minimum 4-ton lots with slight reductions for contracts to the end of the year. 60/62% solid, offered from the continent at £10 15s. per ton, c.i.f. U.K. ports. Broken, £1 per ton more. 30/32% crystals, £7 15s. per ton, c.i.f. U.K. ports.

SULPHUR.—Flowers, £10 10s.; roll, £9 10s.; rock, £9 7s. 6d.; ground, £9 10s. per ton, ex store, spot delivery. Prices nominal.

ZINC CHLORIDE, 98/100%.—On offer from the continent at about £23 10s. per ton, c.i.f. U.K. ports; 96/98% quality of English manufacture quoted about £23 10s. per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Continental manufacture on offer at about £11 15s. per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

BETA NAPHTHOL.—1s. per lb. Small home inquiries.

ALPHA NAPHTHYLAMINE.—1s. 3d. per lb. Fair home inquiries.

METANITRANILINE.—3s. 6d. to 3s. 9d. per lb. Some home inquiries.

DIMETHYLANILINE.—2s. to 2s. 1d. per lb. Some home inquiries.

Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, October 9, 1925.

The consumption of chemicals in the textile industries is much below normal dimensions, a condition of things which is to be expected in view of the operation of the short-time movement in the American section of the cotton trade. Talk of extending the movement has been in the air during the week. If this comes about the prospects of the chemical market in this direction will not be improved. In one or two other industries which are big users of chemicals, conditions are a little brighter. On the whole, a quietly steady business has been put through —certainly up to the average of recent weeks.

Heavy Chemicals

A fair inquiry for hyposulphite of soda has been reported and values are held; photographic crystals are offering at £14 10s. to £15 per ton and commercial material at round £9. Saltcake is still a dull section of the market though quotably unchanged from last report, £3 10s. to £3 12s. 6d. per ton being the range of current values. Glauber salts are also quiet at about £3 10s. per ton. Phosphate of soda is quoted at £12 10s. per ton, but the demand continues quiet. Caustic soda is moderately active for both branches of trade and prices are steady at from £15 12s. 6d. per ton for 60 per cent. material to £18 for 76-77 per cent. Soda crystals are maintained at £5 5s. per ton and sales are fairly good. Chlorate of soda is quiet and a shade easier at 2¾d. per lb. Alkali meets with a quietly steady demand and prices are firm at £6 15s. per ton. Sulphide of sodium is selling rather slowly at round £12 per ton for 60-65 per cent. concentrated solid and £9 5s. per ton for commercial. Acetate of soda is quiet but about unchanged from last report at round £18 per ton. Bicarbonate of soda is steady at £10 10s. per ton but demand is only moderate. Prussiate of soda is maintained at round 4d. per lb., and a fair business is being done.

Both in caustic potash and carbonate of potash there is room for improvement in the demand, although values are steady. Caustic is offering at from £28 to £29 per ton, and carbonate, 96-98 per cent. material, at about £25. Yellow prussiate of potash is still quoted at 7¼d. per lb., a moderate amount of inquiry being met with. Permanganate of potash attracts small attention; pharmaceutical quality is steady at 7¾d. to 8d. per lb., with commercial a little weaker at about 5¾d. Bichromate of potash is not too active but no change in price has occurred, to-day's value being about 5d. per lb. Chlorate of potash is unchanged and in moderate request at 4d. per lb.

Arsenic is weaker again in the absence of any important business, white powdered, Cornish makes, being no better than £17 10s. per ton, on rails, and round £22 in Manchester. Sulphate of copper is only moderately active though prices are steady at round £24 10s. per ton. Acetate of lime is quoted at £14 10s. to £15 per ton for grey and about £8 for brown material; business, however, is restricted. Acetate of lead is only in limited demand though values are well held, white at about £45 and brown at round £40. Nitrate of lead is in quiet request at £41 to £42 per ton. Epsom salts are attracting comparatively little attention at £3 15s. per ton; magnesium sulphate, B.P. quality, is quoted at round £5 5s.

Acids and Coal Tar Products

Among the acids acetic is fairly steady at £38 per ton for 80 per cent. commercial and £66 10s. for glacial, though the demand is rather quiet. Oxalic acid continues inactive and prices are easy at round 3⅝d. per lb. Citric acid is unchanged from last week at 1s. 3d. per lb., but business in this material is restricted. Tartaric acid is in limited request at 11½d. to 11¾d. per lb.

Little alteration can be reported in the coal-tar products section of the market. Pitch keeps quiet at about 38s. per ton. Naphthalene attracts little attention at £12 10s. for refined and £3 15s. and upwards for crude. Solvent naphtha is firm at 1s. 6d. per gallon. Carbolic acid is dull and weak at 4½d. per lb. for crystal and 1s. 3d. to 1s. 4d. per gal. for crude. Creosote oil keeps firm at 5¾d. to 6d. per gallon.

Germany's Dye Trade

Research as Factor for Gaining New Markets

A price war for control of the dye markets of the world is predicted by the U.S. Tariff Commission in a summary of its annual census of dyes and other synthetic organic chemicals.

Germany is out to regain her pre-war trade, the Commission states, and, in view of the tariff barriers, probably will seek foreign affiliations or branch plants in the United States and in Great Britain especially. The domestic industry is making great strides in research and apparently will continue to do so, the Commission says. More than 60 dyes were manufactured in 1924 which were not produced in the previous year. These products show that the industry has made marked progress during the year in producing many complex types, including dyes of high fastness for cotton, wool and silk. Work now under way may be expected to add materially to the variety of dyes and other organic chemicals produced in this country.

The average price of all dyes sold in the U.S.A. in 1924—54 cents per lb.—was a 2 per cent. decline from that of the previous year. The average selling price in 1920 was $1.08 per lb., and in 1917 $1.26 per lb.

A rapid increase in the monthly imports after the reduction in duty indicates increased competition from foreign-made dyes. The imported dyes are almost entirely of German and Swiss manufacture, and consist largely of the higher cost products. The average monthly import of dyes from October, 1924, to July, 1925, inclusive, was 458,960 lb. This is an increase of 15 per cent. over the monthly average of the first nine months of 1924 preceding the tariff reduction on dyes.

American Research

Over $2,000,000 was expended for research in coal-tar products in 1924. When the total value of the finished coal-tar products sold in the same year ($56,000,000) is considered, it is probable that expenditures for investigation in this industry have been greater than in any other industrial field. The total research costs reported to the Tariff Commission have exceeded $25,000,000 for the priod 1917 to 1924. The accomplishments of the domestic dye and coal-tar chemical industry in these years must be attributed in no small part to the large expenditures for research.

Big Amalgamation Completed

It is now reported that the protracted negotiations between members of the Aniline group ended on Monday in an amalgamation of the firms belonging to the I.G. and the German dye industry. The objects of the fusion are stated to be "simplification, improvement and cheapening." The factories controlled by the concern will be divided into four regional groups, Upper, Central, and Lower Rhine, and Central Germany, and five selling centres will be formed for the different products, dyestuffs, nitrates, drugs, artificial silks, photographic chemicals, etc.

The amalgamation will involve £32,000,000 capital and the firms concerned are reported to be the Badische Anilin und Soda Fabrik, Höchster Farbwerke, Freidrick Beyer and Co., the Anilin Fabrikation Co., Leopold Cassella and Co., the Chemische Fabrika Weiler-Ter-Meer, Kalle and Co., and the Chemische Fabrik Griesheim Elektron. The foundation of the present aniline group was laid in 1904 and was, it is reported, to have continued till 1999, but is dissolved by the present foundation.

Dyestuff Licences for September

The following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during September, has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee. The total number of applications received during the month was 570, of which 435 were from merchants or importers. To these should be added 24 cases outstanding on August 31, making a total for the month of 594. These were dealt with as follows: Granted, 405 (of which 379 were dealt with within 7 days of receipt). Referred to British makers of similar products, 121 (of which 93 were dealt with within 7 days of receipt). Referred to Reparation Supplies available, 23 (all dealt with within 2 days of receipt). Outstanding on September 30, 1925, 45. Of the total of 594 applications received, 495, or 83 per cent., were dealt with within 7 days of receipt.

Company News

BRYANT AND MAY, LTD.—An interim dividend of 4 per cent., free of tax, on the ordinary and partnership shares for the half year ended September 30, is payable on October 31.

BORAX CONSOLIDATED, LTD.—A dividend at the rate of 6 per cent. per annum, less tax, is announced on the preferred ordinary shares in respect of the half-year ending September 30, 1925.

HEPPELLS', LTD.—The first report shows a net profit for the period to April 30 of £24,519, and a dividend of 7 per cent. is recommended on the ordinary shares, leaving £5,461 to be carried forward.

RIO TINTO CO.—A half-year's dividend of 2s. 6d. per share on the 5 per cent. preference shares and an interim dividend of 15s. per share on the ordinary shares, both less tax, are announced payable on November 2.

BENZOL AND BY-PRODUCTS, LTD.—It is announced that, owing to the adverse and uncertain industrial situation, the directors have decided not to pay the October interim instalment of cumulative preference dividend until conditions are more favourable.

BRADFORD DYERS' ASSOCIATION, LTD.—A share bonus of three shares on every five existing ordinary shares is proposed, by the capitalisation of £813,886 of the reserve fund. It is proposed also to increase the authorised capital to £6,000,000 by the creation of 500,000 preference shares of £1 each and 500,000 ordinary shares of £1, but it is not intended that any of these shares should be issued at present. A special meeting will be held on October 19 to give effect to these proposals.

HUMBER FISHING AND FISH MANURE CO., LTD.—At the first annual general meeting held on Monday at Hull, the chairman dealt with the strong position of the company's finances and stated that the first report shows that after providing for directors' fees, interest on debenture stock, etc., there remains a net profit of £21,869. After providing for the 7½ per cent. interest on the preference shares, there remains a balance of £15,109, which it was proposed to allocate as follows:—3s. per share dividend on the ordinary shares, less tax; and it was further proposed to write off the sum of £3,146 from goodwill and formation expenses, which would leave an amount of £8,411 to carry forward, which is in excess of the amount required to pay a full year's dividend on the 7½ per cent. preference shares. The chairman remarked that the continued increase in the demand for the company's products was highly satisfactory.

Chemical Science in Russia

A New Moscow Journal

The Russian Journal of Chemical Industry is a new journal, of which four bi-monthly parts covering the period November, 1924—June, 1925, have so far appeared. It is edited at Moscow by Professor Voroshtsheff, who is supported by a strong editorial board consisting of Zelinsky, Ipatjeff, Budnikoff, Kishner, and many other famous Russian chemists. The fifty-one articles contained in the copies under review cover a variety of technical problems, as may be judged from the following papers, which have been selected at random: "The formation of coal," "The purification of gases by electrolytical methods," "The dye industry of Soviet Russia," "The Russian glass industry," "The fundaments of the dry distillation of wood," and "The Siberian sugar industry."

In addition to original articles, the journal contains also reports of scientific and industrial meetings in Russia, abstracts from foreign journals, mainly English and German, and lists of books on chemistry which have appeared in Russia and abroad. Many of the Russian books are translations from other languages, including books written by Arrhenius, Ostwald, Soddy, and Aston, whilst others seem to be devoted to gas-warfare. Thus, out of sixty-nine books published by "Dobrochim," forty-two, which include a translation of Haber's famous speeches defending gas-warfare, are devoted to this question.

The journal is very well edited, and some of the articles make good reading, although they frequently lag behind the times, as, for example, in the case of Professor Nastjukoff's theory of coal formation, which is based on the now obsolete formula of cellulose suggested by A. G. Green, and which disregards all recent progress in the cellulose chemistry, including the classical researches of Sir James Irvine. No doubt, however, the new journal supplies a need both in Russia and elsewhere. It also shows a revival of the Russian chemical industry, as may be judged from the lists of patents granted by the Soviet Government and by the price lists of chemicals, which, incidentally, are based on those of the London market.

M. NIERENSTEIN.

Tariff Changes

FIJI.—The following items are added to the tariff and the rates indicated apply to general and British products—Bitumen, asphaltum or similar road substances—free; spirits, motor fuel, 3d. per gallon.

BELGIUM.—Alterations on rates are as follows (in each case the new "co-efficient" is quoted).—Colours with base of chalk, sulphate of baryta coloured by aniline or mineral pigments, 3.2.

CZECHO-SLOVAKIA.—The following may now be exported without licence:—Mineral oils, crude, refined, or semi-refined, also lubricating oils and residues (except solids).

GERMANY.—Export restrictions have been withdrawn on coal, anthracite, coke and residues, briquettes, crude coal tar. Further details of import duty restrictions include the following:—

Description of Goods.	Period, from the coming into force of the Agreement.	Import Duties.
Oleic acid (olein)	1 year	Existing "general" duty, but not more than 3½ marks per 100 kilogs.
Sulphuric acid, English and fuming:		Existing "general" duties, but not more than:
Less than 60 degs. Baumé	1 year	0.10 marks.
60 degs. Baumé and more	1 year	0.30 marks. per 100 kilogs.
Zinc oxide (zinc white and zinc grey)	6 months	Existing "general" duties.
Artificial silk, not twisted or twisted once.. ..	6 months	Existing "general" duties, but not more than 75 marks per 100 kilogs. for nitrocellulose product.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

CHEMICAL PRODUCTS AND COLOURS.—A firm of manufacturers' agents in Sydney desire to represent in Australia British manufacturers of chemical products, and colours. (Reference No. 397.)

REFRIGERATING PLANT.—An agent in Liége wishes to represent British firms for the sale in Belgium of frigorific apparatus. (Reference No. 414.)

Smoke Abatement Conference

A CONFERENCE on smoke abatement was held last week-end at Buxton, when Mr. R. H. Clayton, of Manchester, outlined a scheme whereby each large centre should have a heating and ventilating department to be responsible for education, research and practical work. Qualified staffs would test all heating and ventilating appliances. He estimated that each centre should have an annual income of £10,000 to be provided by a general rate. Dr. Margaret Fischenden, of the Department of Scientific and Industrial Research, said that the real needs were a satisfactory substitute for raw coal and a substantial reduction in the amount of fuel used.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

HALL, Clarence, trading as COMMERCIAL DYEWARE AND CHEMICAL CO., 406A, Meanwood Road, Leeds, merchant. (C.C., 10/10/25.) £10 18s. 4d. September 4.

WILSON, Mr. B., late trading as JERM KYL CHEMICAL CO., 332, Liverpool Road, Birkdale, chemical merchant. (C.C., 10/10/25.) £13 9s. 6d. September 8.

Deed of Arrangement

HUTCHISON, William Leonard, 110, Dorset Street, Bolton, chemical manufacturer, Mary Eleanor CHAMBERLAIN (by Attorney), 261, Chapman Street, Portland, Oregon, U.S.A., married, Leonard Victor Augustus HUTCHISON, Cavendish Road, Kersal, chemical manufacturer, and James Cecil HUTCHISON, 110, Dorset Street, Bolton, chemical manufacturer, trading at Corporation Chambers, Corporation Street and River Street, Bolton, as L. AND E. HUTCHISON AND CO. (D.A., 10/10/25.) Filed October 2nd. Trustee, S. A. Mayers, 16, Silverwell Street, Bolton, accountant. Liabilities unsecured, £796; assets, less secured claims, £810.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

ASCENSION ISLAND PHOSPHATE AND GUANO CO. (SALES CONCESSION), LTD., London, S.W. (M., 10/10/25.) Registered September 25, £60,000 debentures; general charge. *——. December 31, 1924.

GERARD BROTHERS, LTD., Nottingham, soap manufacturers. (M., 10/10/25.) Registered September 24, £5,000 further debentures, to H. Holford and another, 1, Carlton Street, Nottingham, trustees for Lloyd's Bank, Ltd.; general charge. *£30,000. May 28, 1925.

NEW DETERGENTS, LTD., Wealdstone, soap manufacturers. (M., 10/10/25.) Registered September 23, £3,000 debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act 1908), present issue £1,000; general charge; also reg. September 28, £500 debentures, part of £3,000; general charge. *Nil. August 21, 1925.

TARAPACA AND TOCOPILLA NITRATE CO., LTD., London, E.C. (M., 10/10/25.) Registered September 25, £400,000 debentures, with a premium of 2 per cent. on redemption (secured by Trust Deed dated September 21, 1925); charged on properties in Tocopilla and Tarapaca, also general charge.

London Gazette, &c.

Company Winding Up

THE YADIL PRESS LTD. First and final dividend, 4s. 4½d. per £, payable at the office of the Official Receiver and Liquidator, 33, Carey Street, Lincoln's Inn, London, W.C.2.

Partnership Dissolved

J. LESLIE BROWN AND CO. (John Leslie BROWN and Charles Edward Lacey TAYLOR), brokers and traders in oilseeds, seed oils, tallows and cognate articles, 64, Mark Lane, London, by mutual consent as from September 25, 1925. Debts received or paid by J. L. Brown, who continues the business.

New Companies Registered

BIO-CHEMICAL REMEDIES, LTD. Manufacturers, importers and exporters of, agents for and dealers in all kinds of salts, alkalis and acids, etc. Nominal capital, £7,000 in £1 shares. Solicitors: Day, Johnson-Noad and Co., 61-2, Chancery Lane, London, W.C.2.

JAMES BROAD AND SONS, LTD., Market Street, Lewes. Manufacturers of and wholesale and retail dealers in candles, soap and all articles made from oil and tallow. Nominal capital, £13,000 in £1 shares (7,000 5 per cent. cumulative preference and 6,000 ordinary).

CELLULOSE ACETATE, LTD., 11, Queen Victoria Street, London, E.C.4. Producers and manufacturers of and dealers in non-inflammable films derived from cellulose products and cellulose acetate products, etc. Nominal capital, £2,000 in £1 shares.

DELL'ORTO REFRIGERATING CO., LTD., 50, Farringdon Street, London, E.C.1. Ice merchants and manufacturers, dealers in refrigerants, manufacturers of and dealers in ice-making and refrigerating plant, etc. Nominal capital, £7,500 in £1 shares.

PARSON C. BAKER, LTD., Dacre House, 5, Arundel Street, Strand, London. Wholesale, retail, manufacturing and dispensing chemists and druggists, etc. Nominal capital, £1,500 in £1 shares.

TOTO CO., LTD., 4, Lloyd's Avenue, London, E.C.4. Chemical manufacturers and merchants. Nominal capital, £5,000 in 4,000 participating preference shares of £1 and 20,000 ordinary shares of 1s.

RYDING AND CO. (TRAFFORD PARK), LTD. Chemical manufacturers and merchants. Nominal capital, £5,000 in £1 shares. Solicitors: Crofton, Craven and Co., 36, Brazennose Street, Manchester.

WELLWYNS, LTD., 141, Victoria Street, London, S.W.1. Manufacturers of and dealers in soap, perfumes, etc. Nominal capital, £600 in £1 shares.

"Novocrete"

Successful Results with New Cement Product

AT the statutory meeting of Novocrete and Cement Products, Ltd., held in London on Wednesday, the managing director, Mr. R. Bruce Hay, said that Novocrete, which was cement with an aggregate of sawdust, was found to be admirable for building purposes, either in pre-cast blocks or applied *in situ*. It showed advantages over ordinary cement in the matter of weight and handling. It was fireproof and a non-conductor of heat. Tests had also shown that it would wear longer. A further valuable property was that it could be sawn and plugged for nails.

The company possessed the world rights and proposed to form subsidiary companies in various countries. Already numerous applications had been received for foreign and colonial licences. A factory had been purchased at Park Royal for the manufacture of the company's products and the pre-cast units would be made there.

They had enlarged their American organisation and had formed a separate company. The services of Mr. Hennibique, a well-known concrete expert, had been obtained for this company. Negotiations were proceeding for the establishment of a company in Florida, and details were given of large orders executed in various countries. The chairman also said that they had just entered into, and completed, an agreement with one of the most important firms in this country, which had its own branches all over the world, for the manufacture of their products in one of its factories near Liverpool. This arrangement had necessitated the formation of a subsidiary company, in which their company held the controlling interest. This enabled them to supply economically pre-cast units in a large industrial area.

Similar arrangements to this would, when considered advisable, be entered into; in fact, further negotiations were now proceeding, both here and in America, to bring about such arrangements which would undoubtedly prove beneficial to their company. Work had actually been started on contracts in this country and production would shortly be on a large scale, and the prospects could be regarded as satisfactory.